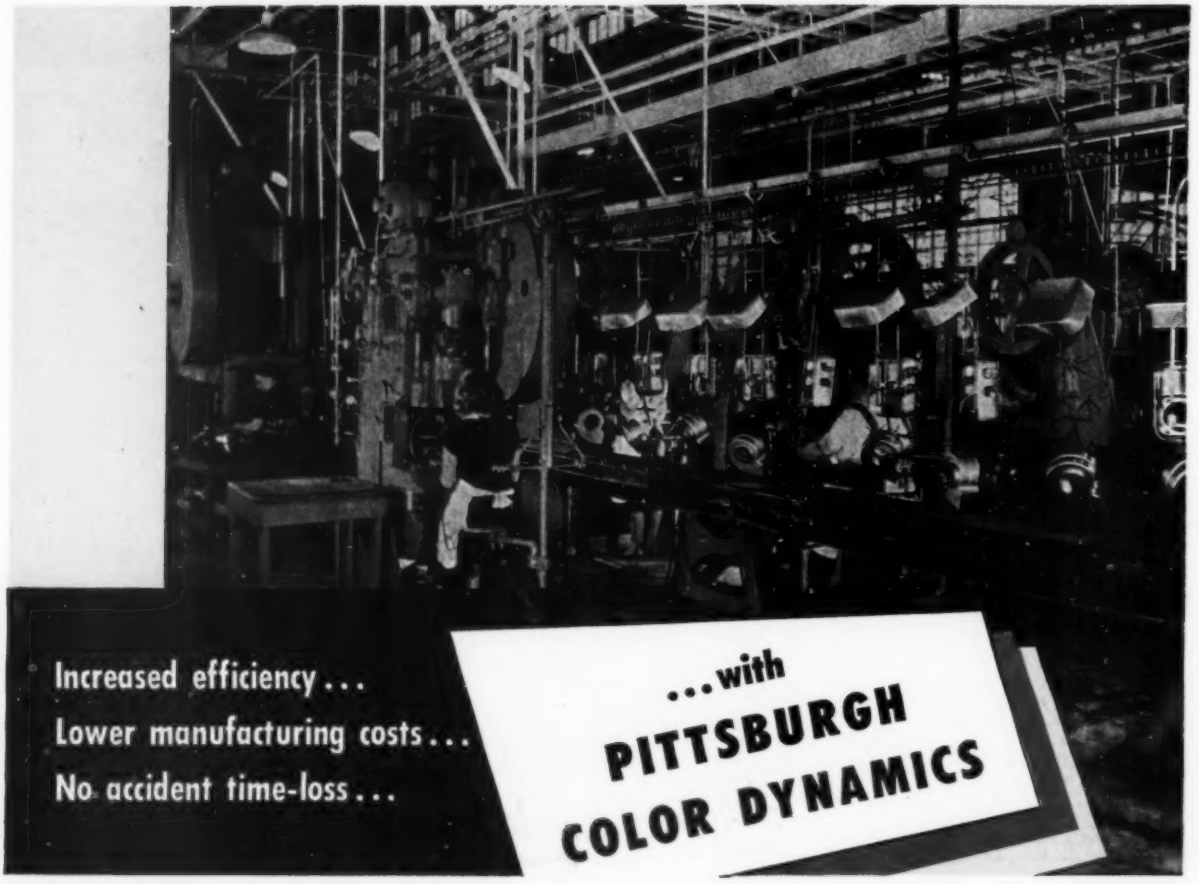
INDUSTRIAL ARTS
and
VOCATIONAL EDUCATION

The Shop Teachers' Professional Magazine



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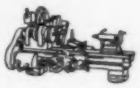
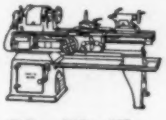

☐ 9" and 10" BENCH LATHES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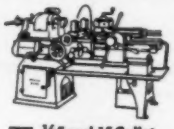
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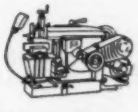
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YOU'LL DO
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Vol. 41 No. 4

APRIL, 1952

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

Published on the 15th of month preceding date of issue

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★ ★ ★ ★

This Month's Cover

The cover picture for the 1952 April issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION was submitted by Stanley O. Opsahl, instructor of photography at the Milwaukee Vocational and Adult Schools, Milwaukee, Wis.

The picture shows a student working on a large core box in the patternmaking department of the school.

Attention

For an excellent listing of free or easy-to-get teaching materials see Chris H. Groneman's article on page 124.

★ ★ ★ ★

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HENRY FORD II presents a 1951 award to Mr. Frank Kidd, an instructor from Edison Vocational School, Baltimore, Maryland.

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INDUSTRIAL ARTS AWARDS

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ASSOCIATION NEWS

COMING CONVENTIONS

Apr. 3–5. Alabama Vocational Association, at Birmingham, Ala. Secretary, Rex Sullivan, Box 1475, University, Ala.

Apr. 3–5 Illinois Vocational Association, at Congress Hotel, Chicago, Ill. Secretary, H. P. Erwin, Board of Education, Mattoon, Ill.

Apr. 3–5 New York State Vocational and Practical Arts Association, at Hotel Syracuse, Syracuse, N. Y. Secretary, R. S. Knouse, N. Y. State College for Teachers, Albany, N. Y.

April 4. Tennessee Vocational Association, at Nashville, Tenn. Secretary, W. A. Seeley, 202 Memorial Bldg., Nashville, Tenn.

Apr. 4–5. California Industrial Education Association, at Laney Trade Technical Institute, Oakland, Calif. Secretary, L. D. Bodkin, 131 Education Bldg., UCLA, Los Angeles, Calif.

Apr. (6) 7–10. Western Arts Association, at Neil House, Columbus, Ohio. Secretary, G. S. Dutch, Geo. Peabody College for Teachers, Nashville, Tenn.

Apr. 16–19. Eastern Arts Association, at Ambassador Hotel, Atlantic City, N. J. Secretary, Miss Lillian D. Swetgart, State Teachers College, Kutztown, Pa.

Apr. 17–19. Florida Industrial Arts Association, at Bayfront Auditorium, Miami, Fla. Secretary, Charles M. King, P.O. Box 364, Clearwater, Fla.

Apr. 17–19. Michigan Industrial Education Society, Inc., at Civic Auditorium and Pantlind Hotel, Grand Rapids, Mich. Secretary, H. E. Rowley, 4152 Kenmore Rd., Berkley, Mich.

Apr. 18. Industrial Education Conference, at Iowa State College Memorial Union, Ames, Iowa. Chairman, Lowell L. Carver, 101 Industrial Arts Bldg., Iowa State College, Ames, Iowa.

Apr. 18–19 Connecticut Industrial Arts Association, at Teachers College, New Britain, Conn. Secretary, Robert Bateson. (No address given.)

Apr. 18–19. Missouri Industrial Education Association, at University of Missouri, Columbia, Mo. Secretary, M. L. Stewart, State Dept. of Education, Industrial Education Section, Jefferson City, Mo.

Apr. 18–19. Pennsylvania Industrial Arts Conference, at State Teachers College, Cheyney, Pa. Secretary, Rufus C. Johnson, Jr., Dept. of Public Instruction, State Teachers College.

Apr. 25. Michigan Vocational Association, at University of Michigan, Ann Arbor, Mich. Secretary, M. H. Pancost, 419 N. Capitol Ave., Lansing, Mich.

EPT INITIATION AT FRANKLIN HIGH SCHOOL AT STOCKTON, CALIFORNIA

Forty-eight industrial-arts majors of Chico State College, Fresno State College, and San Jose State College were initiated into Epsilon Pi Tau, National Honorary Industrial Arts Fraternity, on

(Continued on page 6A)

Epsilon Pi Tau initiation at Stockton, Calif. Initiated were 48 industrial-arts majors of Chico State College, Fresno State College, and San Jose State College — Bernie Law, President, Rho Chapter, San Jose State College

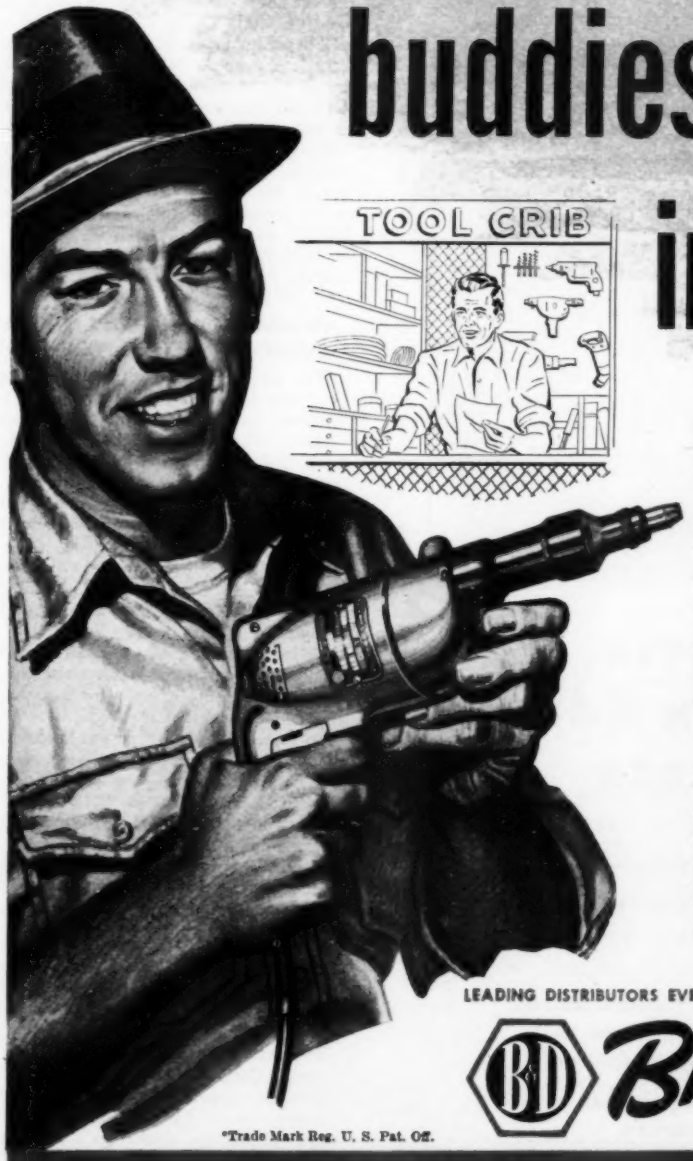
Reading from left to right, first row: James S. David, Fresno; Richard L. Cleland, Fresno; Harold L. Cleland, Fresno; John Pruett, San Jose; Edward DeMello, San Jose; John Rogers, San Jose; Roy F. Anderson, Jr., San Jose; Ira C. Gilliland, Fresno; Charles C. Geddes, Fresno

Second row: Ronald Rutledge, San Jose; Richard Peterson, San Jose; Fred R. Davis, Fresno; Harold Plummer, San Jose; James F. Frazer, San Jose; Lewis K. Hunter, San Jose; Arthur Stover, San Jose; Robert McKeown, San Jose; Marvin Hess, San Jose; Curtis E. Lackey, Fresno; Patrick Costello, Fresno

Third row: William O'Brien, San Jose; Milton D. Davis, Fresno; Thomas Kurihara, Fresno; Neil McCrea, San Jose; Robert Maggiretti, San Jose; Joe Lotz, San Jose; Melin F. Spenhoff, Fresno; Hans C. Olsen, Fresno; Van B. Lawrence, U. C., Berkeley; Robert E. Hutchinson, Fresno; Royle Leighton, Fresno; Robert Callanan, Fresno

Fourth row: Henry H. Ostendorf, San Jose; Fred Dunning, San Jose; Andrew Koval, Chico; Robert Meier, Chico; Jerry Lundin, Chico; Anson Thompson, Chico; Stanley Seymour, Chico; Kenneth Dunbar, Chico; Loren Lewis, Chico; Norman Sanden, Chico

"We were buddies back in school"



It's like meeting old friends when your students find the same Black & Decker Tools on the job that they trained with in school. Makes the switch from school to shop a lot easier! Teachers find *their* work easier, too, when they use B&D Tools. They're easy to handle, husky, dependable. Built-in safety devices cut down beginner nervousness. Give your students this extra break . . . train them on industry-proved Black & Decker Tools.

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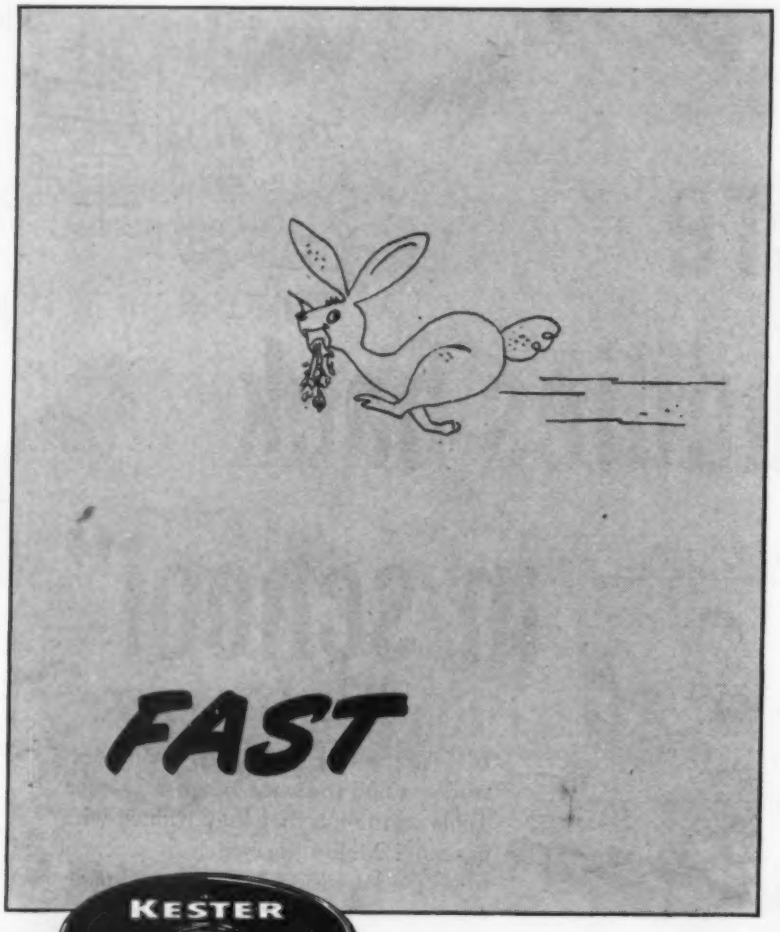

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Two Free Manuals: One for the instructor and a modified version for the student.

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ASSOCIATION NEWS

(Continued from page 4A)

December 8, 1951, at Stockton, Calif., Franklin High School being the setting. Members of four northern California chapters of this fraternity co-operated to make this a most impressive ceremony. They were: Kappa Chapter of Chico, Rho Chapter of San Jose, Alpha-Lambda Chapter of Fresno, and Gamma Field Chapter of San Francisco-Oakland.

Prof. Marion A. Grosse, head of industrial arts at Fresno State College, co-ordinated the program with the assistance of Prof. Russell B. Kidder of Chico State College, and Dr. Heber A. Sotzin of San Jose State College.

A beautiful program, produced by the graphic arts department of San Jose State College, reflected the spirit of this historical organization, while the initiating team provided a memorable ceremony which all initiates will not easily forget.

More than 150 alumni and guests attended the initiation banquet in addition to student members of the fraternity. Dr. Heber A. Sotzin, head of the Division of Applied Arts, San Jose State College, and Governor of the Western Division of Epsilon Pi Tau, delivered the evening's address entitled, "The Era of Challenge: Let's Face It."

VIRGINIA'S INDUSTRIAL EDUCATION CLUBS PLAN STATE-WIDE MEETING

The Second Annual State-Wide Meeting of Trade and Industrial Education teachers and those interested in promoting industrial education in Virginia will be held in Richmond some time in April. The eight industrial education clubs in the Old Dominion are planning this meeting through their representatives serving in a central body known as the Virginia Council of Industrial Education Clubs.

On Saturday, November 3, 1951, two members from each of the participating clubs met in Richmond to formulate a constitution and organize as a permanent group.

Under the direction of Professor Joseph A. Schad, head, industrial-arts department, Virginia Polytechnic Institute, plans for the state meeting and dinner are rapidly crystallizing. An afternoon meeting featuring an outstanding leader in the field of industrial education and an exhibit will be an added treat this year. Work done by industrial-arts students at V. P. I., and potential teachers in the field will be displayed. The evening dinner meeting will be patterned after the well-attended meeting held last spring, replete with a prominent speaker, guests, ship program, entertainment and good fellowship.

♦ The California Industrial Education Association, Southern Section, held a convention on Saturday, January 12, at Westchester High School. Over 700 shop men attended the day's programs.

Following a short business meeting President Lyman Goldsmith introduced Dr. Heber A. Sotzin, director of industrial arts, San Jose State College, who gave an address, "Meeting the Challenge of Modern Education." Dr. Sotzin's talk was an interest-packed presentation. The luncheon was followed by section meetings in nine industrial education divisions. At each meeting the latest instructional aids were presented under the leadership of capable chairmen. Visitation of shops and all local arrangements were ably handled by Chairman Fred Ullrich and his coworkers of the industrial-arts department at Westchester. — *Wayne A. Wonacott.*

(Continued on page 8A)

for graphic instruction in machine operation . . .

filmstrips

Now, by means of filmstrips, Walker-Turner demonstrates correct way to use power tools

What's the first step in sawing a rabbet in a board? How does the toothed pawl operate to prevent kickbacks? What is the correct method of removing a blade from the arbor?

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ASSOCIATION NEWS

(Continued from page 6A)

♦ At the annual meeting of the National Council of Local Administrators of Vocational and Practical Arts and Education, held in Minneapolis, Minn., in conjunction with the American Vocational Association Convention on November 26 to December 1, Dr. Albert E. Jochen, director of the Middlesex County Vocational Schools, was elected vice-president, and George W. Morgenroth, assistant director of the Essex County Vocational Schools, was elected secretary. Over 1000 school administrators from 32 states and Canada are members of the Council.

♦ J. F. INGRAM, Alabama State Supervisor of Vocational Industrial Education, was elected president of the National Association of State Supervisors of Trade and Industrial Education at the 1951 AVA Convention.

Mr. Ingram was also elected to represent the 12 southeastern states on the National Advisory Council for Vocational Industrial Education.

H. J. VAN WESTRIENEN, Michigan, will serve this year as the Association's vice-president, and H. N. MILLER, Washington, was re-elected secretary-treasurer.

♦ New officers of the American Technical Education Association, elected in Minneapolis at the AVA 1951 Convention, are as follows: W. P. FERGUSON, principal, Danforth Technical School, Toronto, Canada, president; RICHARD W. HOWES, Connecticut assistant state director of trade and industrial education, vice-president; and FRANK J. COYLE, New York state supervisor of trade and technical education, secretary-treasurer.

♦ JAMES R. D. EDDY, dean, industrial and business training bureau, division of extension, the University of Texas, was elected president of the National Association of Industrial Teacher Educators at their recent meeting in Minneapolis. Formerly known as the National Association of Industrial Teacher Trainers, the NAITE represents all colleges and universities training industrial arts or vocational industrial teachers.

♦ The 1952 annual convention of the Wisconsin Association of Vocational and Adult Education will be held in Madison on May 9 and 10.

A "Report of the Committee on Philosophy and Program of Vocational and Adult Education," prepared under the auspices of the Wisconsin Association of Directors of Vocational and Adult Education, has been distributed to WAVAE members.

♦ Activities of Epsilon Pi Tau, Alpha Chapter:

1. *Founder's Day Program.* This year this annual event was held in the new Union Building at Ohio State University, Columbus, Ohio. The initiation was held at 4:30 p.m. on Friday, March 7, and the banquet at 6:30 p.m.

The speaker was Dr. G. Harold Silvius, chairman of the department of industrial education at Wayne University in Detroit, Mich.

2. An industrial film critique was held in the private studios of the Censor Board in the new State Office Building on Saturday morning, February 16, at 9:30.

3. The Ohio Industrial Arts Association Convention will be held this year in the Deshler-Wallick Hotel in Columbus on Thursday, Friday, and Saturday, March 27, 28, and 29.

4. The headquarters for the American Industrial Arts Association convention will be in the Congress Hotel from April 30 through May 3. The EPT initiation will be in the hotel at 4:30 p.m. The banquet at 6:00 will include a symposium program involving Laureate and Honor members. — *William A. Mays.*

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. . . Timken "Zero-Precision" Tapered Roller Spindle Bearings (the absolute in accuracy) permit student work to ten-thousandths of an inch, and hold this accuracy without constant maintenance.

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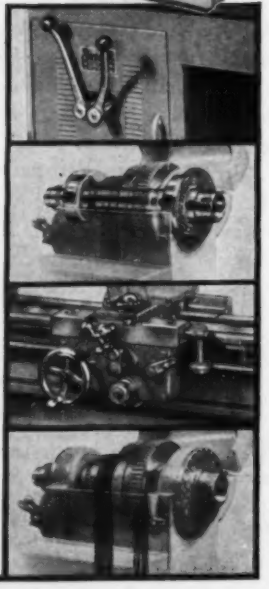
The extra swing and greater collet capacity increase the range of possible student projects—from the "playing store" group to the practical. The extra power to the spindle, the speed range, weight and strength of SHELDON Precision Lathes permit heavy cuts, spinning and demonstration of correct use of new cast-alloy and carbide-tipped cutters.



Built by modern methods, with the finest machine-tool special machinery, on a continuous production line basis, these better lathes cost little more than ordinary school type lathes. *Write for Catalog*

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Personal News

DR. DAVID SNEDDEN PASSES

Dr. David Snedden, well-known authority in vocational education, whose experiences ran the full gamut of positions in the field of teaching and administration, died at his home in Palo Alto, Calif., on December 1, 1951, at the age of 83.

He was born in Havilah, Calif., November 19, 1868. He received the B.A. degree at St. Vincent's (Calif.) in 1889, and at Stanford in 1897. The M.A. degree was earned at Columbia in 1901, and the Ph.D. degree in 1907.

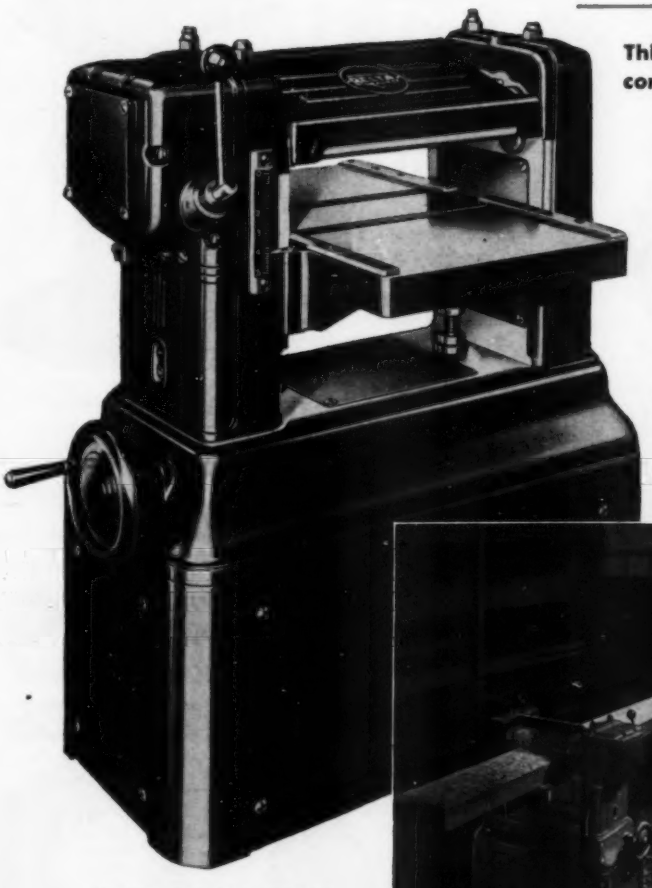
He held the position of school principal at Santa Paula, Calif., from 1892 to 1895; a similar position at Paso Robles from 1897 to 1901; assistant professor of education at Stanford, Calif., from 1901 to 1905; and adjunct professor of educational administration at Columbia, 1905 to 1909. He was state commissioner of Massachusetts from 1909 to 1916; professor of educational sociology and vocational education at Teachers College, Columbia, from 1916 to 1936, and was then made professor emeritus upon his retirement.

He belonged to many professional organizations and was the author of much educational literature.

(Continued on page 24A)

Train Men on Industry's Choice— the DELTA 13"x5" PLANER

—"SAFEST PLANER EVER BUILT"



This precision-built machine will develop skill and competence in your students, because it is . . .

SAFE! —Cannot "kick-back" . . . All moving parts completely enclosed or guarded . . . Blades can never strike the table . . . All controls located within easy reach at a safe distance from the moving stock.

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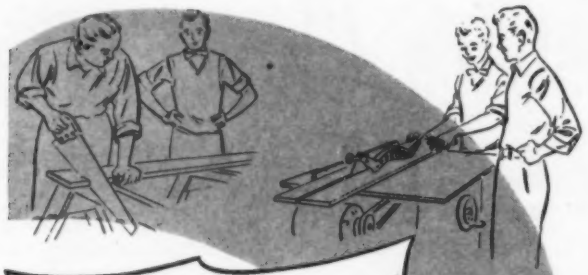

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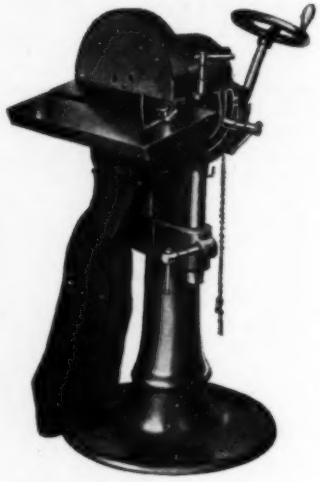

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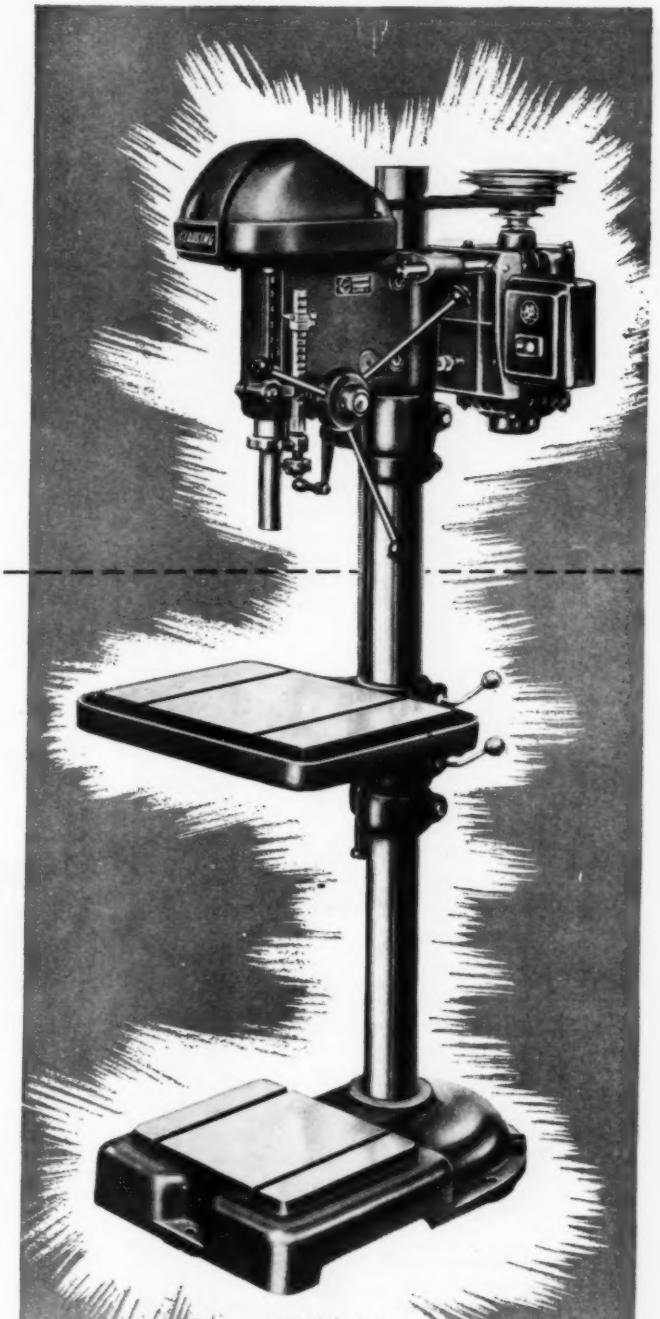

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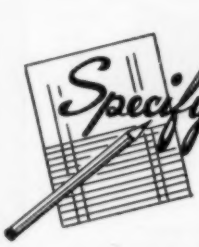

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New Eye-Saving Finish
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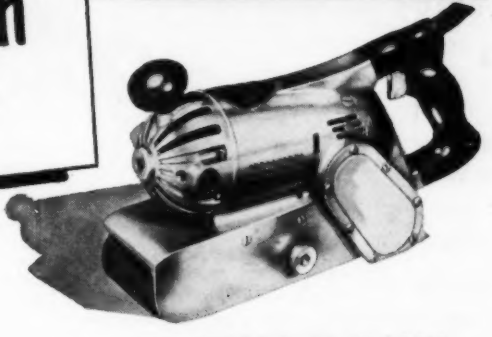

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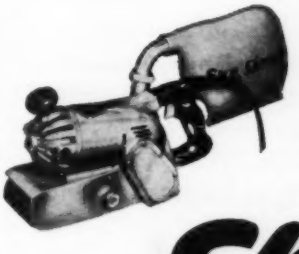

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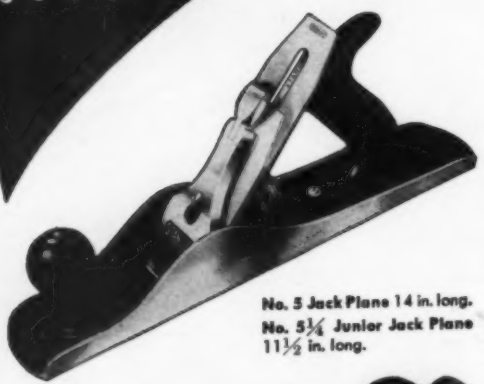

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Stanley Nos. 5 and 5¼, and No. 118 planes are recommended especially for school shop use. Fast, clean-cutting action . . . easy adjustments, quality workmanship and balance. Specify Stanley Planes on your next tool requisition, the most for your tool dollar because they last so long. Stanley Tools, Educational Dept., 112 Elm Street, New Britain, Conn.

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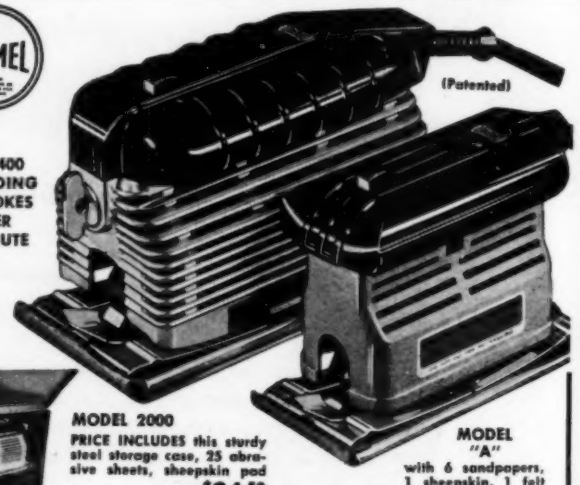

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MODEL 2000
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with 6 sandpapers, 1 sheepskin, 1 felt pad — $14.85

DREMEL STRAIGHT-LINE ACTION SANDERS GUARANTEE SCRATCH-FREE FINISHES • • •

Both of these Dremel straight-line action sanders are ruggedly constructed — ideal for student use — Model 2000 for any type woodworking assignment, including desk refinishing, general school maintenance — Model "A" for lighter projects. Each model has only 2 moving parts — requires no oiling or attention — uses 110-120 V., 60 cycle A.C. Model 2000 has 21 sq. in. sanding surface, weighs 5 lbs. Model "A" has 12 sq. in. sanding surface, weighs 2½ lbs. Both are excellent polishers. Dremel Sanders are precision tools widely used in schools, home workshops, and industry. Fully guaranteed. If your dealer can't supply, order direct.

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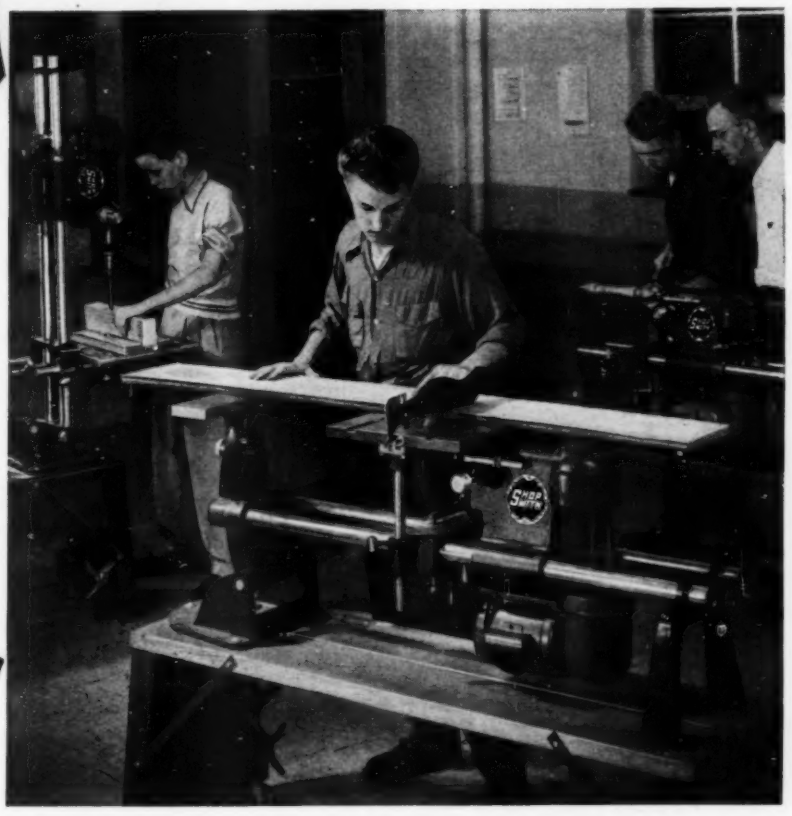
DREMEL MANUFACTURING CO. Dept 312-D RACINE, WIS.

Can you find the 15 power tools in this picture?



THIS PICTURE illustrates an important new concept in industrial arts training. It's the *Flexible Shop*. It's based on the flexibility inherent in SHOPSMITH, Magna Engineering's multi-purpose power tool.

In the *Flexible Shop*, flexible work stations supplement or take the place of individual power tools. Each of the three SHOPSMITHS pictured above is actually five tools—8" circular saw, 12" disc sander, 33" wood lathe, 15" vertical drill press and horizontal drill. Each can be changed to fit the needs of the class or the teaching techniques of the instructor.

The advantages are apparent and impressive: faster indoctrination in the safe and proper use of each tool (since all SHOPSMITHS can be set up alike), fewer tie-ups (since SHOPSMITHS can be changed to relieve the pressure on one type of tool), 50% saving in space (SHOPSMITH requires a working area of 48 sq. ft. compared to 104 sq. ft. for five separate tools) and fewer budget restrictions (SHOPSMITH costs $189.50 less motor, $232.45 with motor and special school guards).

In each of its five basic positions, SHOPSMITH is a different, basic, single-purpose tool—a tool that will equal or exceed the performance of the tool it replaces. Operation is standard. Quality is well above standard — heavy, fine grain castings; ball-bearing spindle, tolerances found only in the finest tools. Write for results of educators' research on the *Flexible Shop* and detailed SHOPSMITH specifications.

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Dept. 202-U, *at factory nearest you*
12819 Coit Road, Cleveland 8, Ohio, OR Menlo Park, California

• Please send me complete information about the *Flexible Shop* and the application of SHOPSMITH to industrial arts education.

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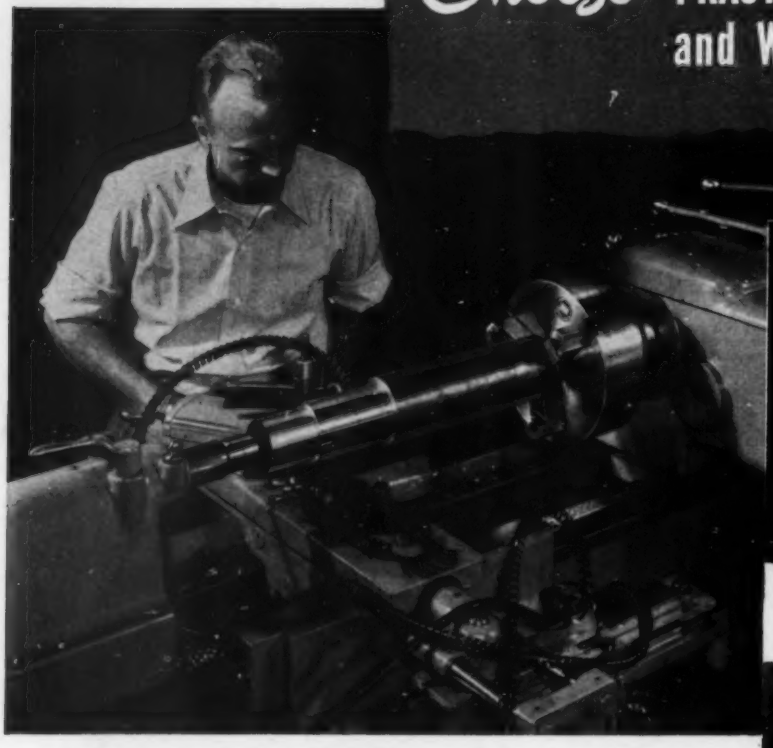
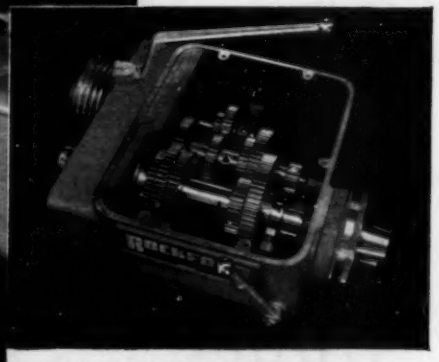
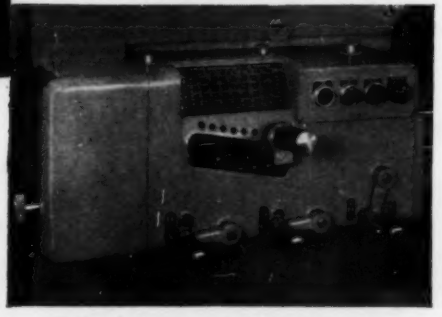
Choose: PRACTICAL PRODUCTION SIZE and WIDE JOB FLEXIBILITY



The Rockford Economy Lathe is of sufficiently heavy construction to stand up under general production and maintenance use, while providing the accuracy needed for the tool room. Its dimensions are ample. High quality materials are used liberally and judiciously.



All headstock gears are cut from individual pre-heat treated steel forgings, annealed to the hardest machinable state and hobbed and shaved to provide smooth, quiet operation.



The quick change gear is designed to provide a full range of commonly used threads from 4 to 56 per inch and carriage feeds from .004" to .060" per revolution of spindle.

The heavily constructed tail-stock is equipped with anti-friction, thrust bearings for ease of operation.

● When you check the Rockford Economy Lathe, you'll see how highly qualified Rockford engineers have combined quality materials, modern machine tool design, and precision workmanship to provide a better Lathe in the medium price range for general production, maintenance and tool room work.

A Rockford representative will give you full details, or send for Bulletin No. 900G.

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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

APRIL 1952

Vitalizing An Industrial-Arts Exhibit

ROBERT W. CYNAR
Supervisor of Industrial Arts
Elementary and Junior High Schools
New York City, N. Y.

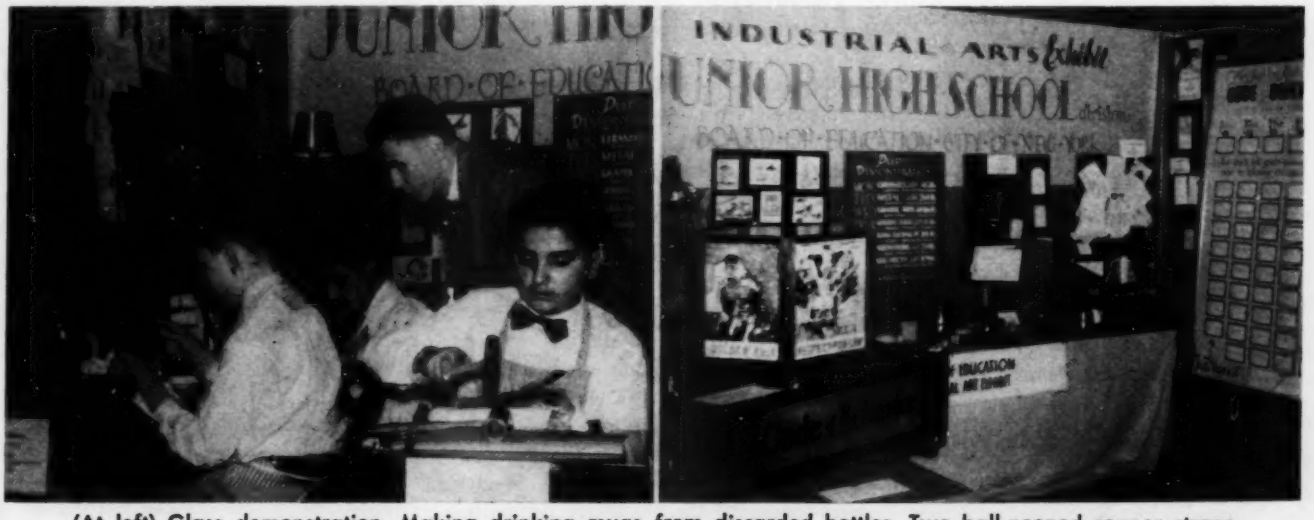
In a large city the board of education is frequently called upon by various civic and philanthropic groups to prepare an exhibit for their yearly expositions. Such was the recent request received by the New York City board of education from the Women's International Exposition. This is a nonsectarian organization, listing among its co-operating committees such groups as: The Women for World Friendship and Understanding; The Health Organizations Committee; Prevention of Juvenile Delinquency Committee; International Federation of Hand Arts, and the Catholic Lay Organizations Committee. In addition to these, there are 22 nationality groups who also were exhibitors at the exposition. Many of these groups had priceless national treasures on display and all the attendants were dressed in colorful native costumes.

It was against this spectacular background of pageantry that the Youth Council was called upon last year to prepare an exhibit based on the "Code of Behavior." Consequently, with nothing more to offer than pupil compositions and a few photographs, the board of education exhibit was colorless.

This year, Jesse G. Fox, assistant superintendent of the Junior High School Division, suggested that the industrial-arts department assume the assignment. After due deliberation by the exhibit committee, it was decided that if we were to compete with 115 exhibitors we had to plan something unusual which would be of interest to the general public. Therefore, we decided that the exhibit be prepared in three sections.

Section One

The Code of Behavior Theme was retained because of its inherent citizenship value. But instead of offering student compositions as the sole means of communication, the idea was vitalized and the basic concepts of the code were adapted into a large 4 by 6-ft. Question Board. The five articles, which were typewritten in jumbo type on the reverse side of an index card, were inserted in slits on a 4½ by 6½-in. sheet of copper, making this one of the contacts. Below this were 36 varying situations. The problem was to select



(At left) Glass demonstration. Making drinking mugs from discarded bottles. Two ball-peened copper straps fastened to a carved wooden handle make this a most attractive project. (At right) General view of exhibit, showing question board and combination flasher and revolving sign

a situation and then find the correct article of the code of behavior that would govern your actions under these circumstances. When the correct selection was made, and the two pointers placed on both contact points the circuit would be completed and a bulb illuminated. Needless to say that this proved most attractive to the 140,000 who visited the exposition.

Our Code of Behavior was developed and adopted by the student body of the Junior High Schools:

CODE OF BEHAVIOR

1. I will never knowingly by word or deed injure anyone's person, feelings, or property in any manner.
2. I will always respect the religious beliefs of others as I respect my own.
3. I will show courtesy to other people at all times, particularly to my elders.
4. I will abide by the laws and regulations of my school and community.
5. I will be honest with myself and others, and I will practice cleanliness of mind and body at all times.

In addition to the question board, we had a combination flasher and revolving sign, based on the Code of Behavior. The five articles of the code were interpreted and printed on a sheet of frosted lumarith, by a junior high student. These were then placed inside the revolving pentagon which was illuminated from within. These two pieces were constructed by the students and the faculty of two of our junior high schools. As an extra means of promotion, the graphic arts shops provided approximately 5000 copies of the code for general distribution.

Section Two

The second section of the exhibit consisted of pupil demonstrations. The exposition was opened an entire week and a different group demonstrated each day. Although the exposition was open from 12 noon until 11 p.m., the students demonstrated from 12 noon until 5 p.m. The show was covered in the evening by the industrial-arts supervisors. It may be added at this point that the exhibit lost much of its attraction when the students completed their assignment.

Demonstration Projects

Ceramics: Making of a plaster cup, using a shop made template.

Metal: Tie clips and pins, simple soldering with alcohol lamps.

Graphic Arts: Spiral binding of memorandum booklets for general distribution and linoleum block cutting.

Arts & Crafts: Sculpstone and metal repoussé.

Working With Glass: Making drinking mugs from discarded bottles. Two ball-peened copper straps fastened to a carved wooden handle make this a most attractive project.

Woodwork: Miter jointed jewel box.

Electricity: Telegraph set, continuity tester, hot plate, and toaster. Demonstrating a student-made Tesla Coil.

Schedule of Demonstrations

Day	*Activity*	*School*	*Teacher*	*No. of Demonstrators*
Monday	Ceramics	J.H.S. No. 45 Bronx	Gerald Goldman	3
Tuesday	Metal	J.H.S. No. 214 Brooklyn	Charles G. Fischer	5
Wednesday	Graphic Arts	J.H.S. No. 66 Brooklyn	Louis Tana	4
Thursday	Arts & Crafts	J.H.S. No. 6 Brooklyn	Donald Pitkoff	2
Friday	Working With Glass	J.H.S. No. 201 Brooklyn	Merritt Richmond	3
Saturday	Woodwork	J.H.S. No. 234 Brooklyn	Max Parnes	3
Sunday	Electricity	J.H.S. No. 109 Brooklyn	Edward Weston	4

Section Three

The industrial-arts projects on display were obtained from the seven demonstrating schools. This was the most expedient method of doing the job for several reasons. The time given us to prepare for the exposition was much too short, it was impossible to visit the 83 junior high schools in New York City to select the best-made student projects; and the size of the booth was such that we could not possibly display more than fifty projects. However, the projects on display were representative of the work done in our industrial-arts shops.

Next year we are contemplating a city-wide contest to be held in conjunction with the Women's International Exposition. School exhibits will be held in May, the three best-made projects from each shop to qualify for the borough competition, which will be held in June. The final prize winners will be selected at the following exposition in November.

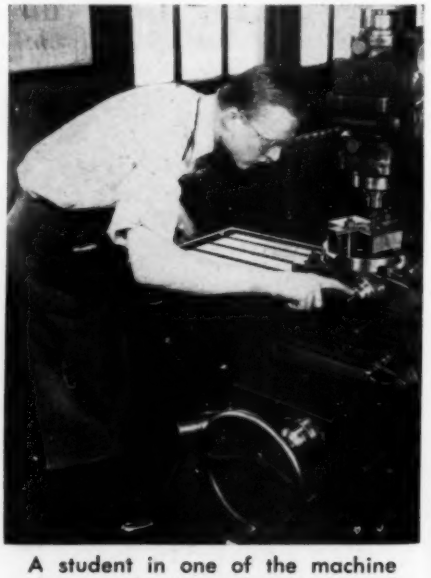
Conclusion

The advantages derived from an exposition such as this are numerous. Many of the visitors expressed amazement when they learned that our public school children were given the opportunity to explore the industrial world. Several were so impressed with the projects on display that they suggested a central store be established for the sale of these projects to — "encourage the children."

Our teacher-demonstrators answered many requests from Boy Scout, Girl Scout, and other club leaders on the methods, procedures, and techniques used in making these projects. Merritt Richmond, one of our teacher demonstrators, was interviewed by a reporter from the Columbia Broadcasting System. Edward Weston, who conducted the electricity demonstration, was personally invited by the manager of General Electric to visit their plant with his classes. Undoubtedly, there were many other incidents that would indicate an awareness, interest, and approbation of the industrial-arts program in the junior high schools.

It was an interesting experience for the students to take part in such a huge venture. In addition to demonstrating they were ever eager to discuss their work with the visitors who were impressed with their knowledge of the subject. Three of the pupil demonstrators were interviewed over radio station WNYC. Students who had projects on display were awarded a beautifully printed two-color certificate of award by the Women's International Exposition.

In the light of this experience, there are several points to remember in organizing an exhibit. For the general public, such as attended this exposition, the greatest attraction is a pupil demonstration. The next best attraction is to have some mechanical device, whereby the visitor becomes part of the act. Finally a display of student-made projects is always appealing, especially to individuals or groups working with children.



A student in one of the machine shops at the Milwaukee Vocational and Adult Schools

— Photo by Stanley O. Opsahl, teacher of photography

The Renaissance of a Machine Shop

JOHN F. ROBOHM
Consultant, Industrial Education
Minneapolis, Minn.

Something had to be done — and soon. Like the "wonderful one-hoss shay," the old South High Machine Shop was falling apart all at once. What precipitated the collapse was the fact that an "old-timer," a faithful, loyal teacher, had reached the compulsory retirement age and had to quit.

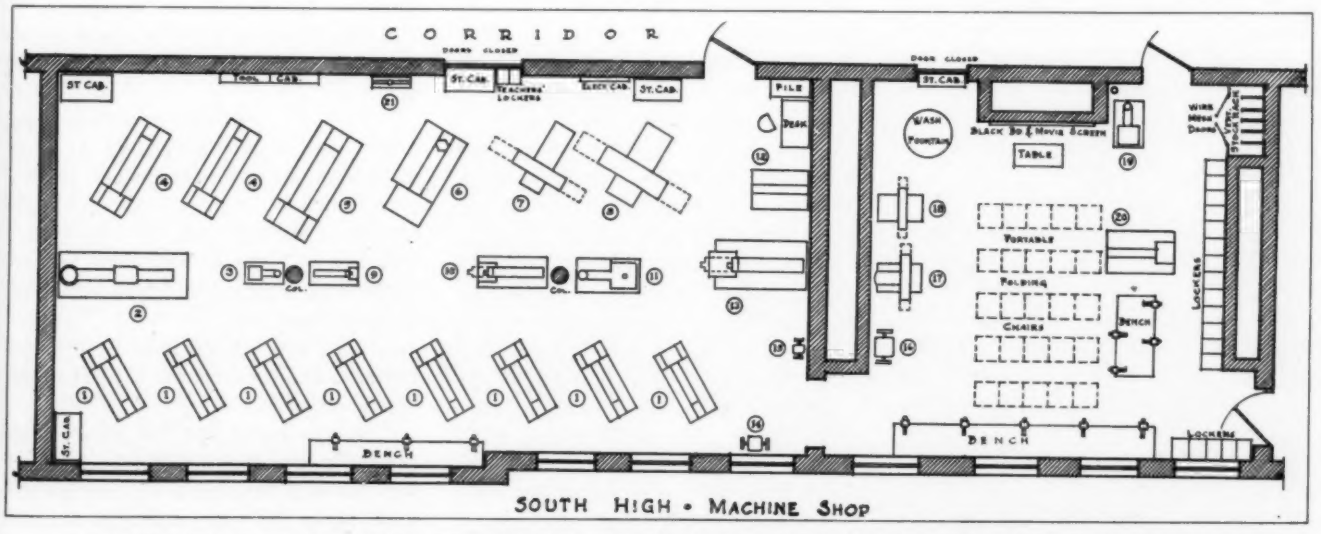
This teacher, by means of patience, perseverance, co-operation with the maintenance department, skill, and the use of a goodly amount of his own spare time in the making of repair parts for the machines, had managed to keep the shop operating. His efforts had kept the ancient equipment — some of the machines being over forty years old — going during the depression period when there was no money to purchase new equipment, and the war years when there were neither machines available to be purchased nor money with which to buy them.

Following his retirement, two successive substitutes (for good teachers on a permanent basis were hard to find right after the war) hastened the final deterioration. These substitute teachers neither knew nor cared to understand the intricacies of the maze of belting and line shafting — countershafting suspended beneath the dark, spattered ceiling, from shaft hangers that dripped oil on the unwary below. Also the step cone pulleys on the countershafts with their crutches, belt shifters and idlers — which likewise required oiling periodically, were a constant source of trouble.

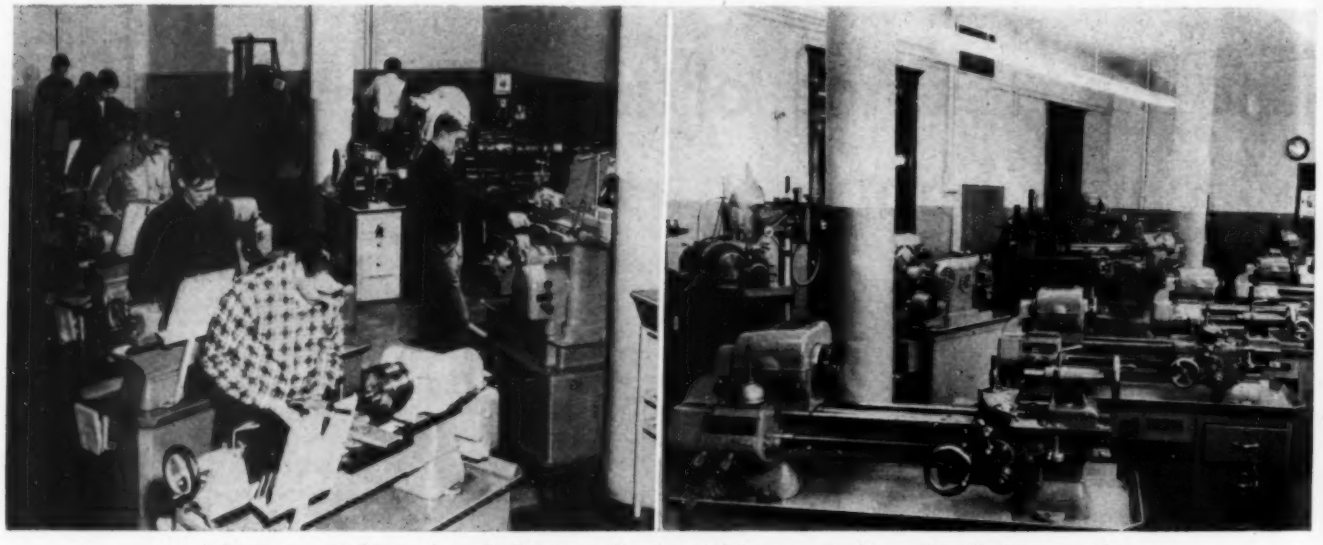
The maintenance department complained that the machines were so old that the manufacturers no longer stocked repair parts for them. Thus it was costing more for repairs than the machines were worth as every repair job required that the parts be made up "special." Not only that, but two of the seven old lathes had been cannibalized in an effort to keep the other five operating.

To say the least, the situation was deplorable. The shop itself was depressing with dirty walls and ceiling blackened with age and oil stains. The floors were of wood and so badly oil soaked as to be dangerously slippery, besides having several spots where the wood flooring was completely worn through. Three small cluster lights close up under the ceiling were the only source of artificial lighting for dark days, and they struggled to glow but weakly through the forest of belts and shifting levers.

Finally came the crowning blow. The inspectors for the State Industrial Commission condemned the shop, "Because the condition of the floors constitutes a hazard — and certain of the machines are considered dangerous without proper safeguards." Unless corrective measures were



1. Engine lathe; 2. radial drill; 3. floor drill; 4. engine lathe; 5. engine lathe; 6. turrett lathe; 7. milling machine; 8. milling machine; 9. shaper; 10. shaper; 11. drill press; 12. band saw; 13. shaper; 14. grinder; 15. grinder; 16. grinder; 17. tool and cutter grinder; 18. surface grinder; 19. floor drill; 20. power hack saw; 21. arbor press



(At left) New machine shop looking south; (at right) new machine shop looking northwest

taken at once, the shop would be closed.

But South High needed a machine shop. It was unthinkable that the school should be without one as traditionally machine shop work had been part of the curriculum at South since the early 1900's.

Moreover, South High is situated in a district of modest homes and incomes. The college tradition is lacking as not more than 10 per cent of its graduates ever go on to institutions of higher learning. The economic necessities of the students' families require that they enter full employment as soon as possible after they finish high school. This points up the need for a curriculum with as much opportunity for prevocational training as can be provided.

Obviously a strong industrial-arts program is indicated and emphasis on machine-shop work comes naturally on account of the excellent possibilities for placement in that field. There is a large tractor manufacturing plant less than a mile from the school and a number of smaller machine shops are also located either within or closely adjacent to the school district. These companies offer opportunities for employment to all qualified graduates of the school. Surely a good machine shop was justified under these conditions.

Let it not be assumed that we were surprised or unprepared when the collapse and condemnation of the shop came. For several years the consultant in industrial education had been trying to get the renovation work started, but always, "No money available" was the answer. Some excellent machines obtained from War Surplus had been installed in the shop so that there was some good usable equipment.

The old shop consisted of a large room 47 feet long by 24 feet wide and an adjoining room 22 by 23 feet with a door between them. The smaller room contained a large tool crib and had a double row of wash bowls right down the middle with 42 double tier lockers around the walls. All of the machines were in the large shop. The only provision for bench work was one 5-foot workbench against one wall containing two machinist's vises. All of the old machines were belt driven from overhead line shafts with two 15 h.p. motors suspended from the ceiling; except the machines obtained from War Surplus which had individual motors.

The accompanying photograph taken in the old shop shows one of its most attractive aspects and some of the old machines, the complete list being as follows:

4 American, 14 in. by 5-ft. engine lathes
2 American, 15 in. by 6-ft. engine lathes
1 Hamilton, 16 in. by 6-ft. engine lathe
1 Kempsmith No. 1 milling machine
1 American 16-in. shaper
1 Smith and Mills 16-in. shaper
1 12 in. by 2-in. grinder
1 LeBlond No. 1 tool and cutter grinder
1 Rockford 20-in. drill press
1 Buffalo 20-in. drill press

The War Surplus machines are listed with the equipment for the new shop.

In conferences between the principal and the consultant looking toward the renovation of the shop several points were decided upon. A lecture-demonstration space was a necessity and it could be easily provided by making a few basic changes:

1. Eliminate the tool crib by placing tool cabinets around the shop convenient to the machines. Each new lathe to be on a steel bench with drawers in which to keep its own chucks and individual accessories.

2. Remove the old wash bowls and replace them with a circular wash fountain.

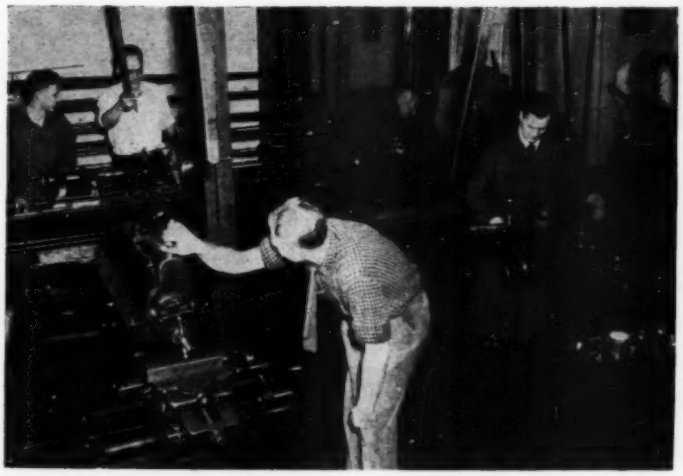
3. This would leave a clear space in the center of the smaller room and steel folding chairs would give the necessary seating for the class. When not in use, the chairs could be stored under the workbench.

4. Black window shades would enable motion pictures and film strips to be shown.

5. Removal of the old large lockers and substitution in their stead of 12 by 12 by 15-inch lockers for students' projects would provide for more than double the number of students and still take up less wall space. These lockers were to have combination locks master-keyed to save the teacher's time.

6. Adequate lighting must be provided and acoustical treatment of the ceiling was highly desirable.

7. It was hoped that the partition between the two rooms might be removed, but this was impossible because of vent ducts, steam and water pipes and electrical conduits in the partition. However, the door could be removed and a considerably wider opening provided.



The old machine shop. Picture taken in 1941

8. Additional facilities for bench work would also be made available.

Likewise, in anticipation of the remodeling work, the consultant had called together, as a committee of the whole, all of the machine-shop teachers in the city high schools. They were each invited to suggest the sizes, numbers, types, and makes of machines which they would like to see provided in a modern high school machine shop. After several meetings and much spirited discussion a tentative list of equipment was arrived at.

The next step was the arrangement and location of the machines in the shop. Here the consultant worked first with the principal and industrial-arts shop teachers in the school since they were familiar with the rooms and the facilities available in the building. A tentative arrangement was agreed upon and the consultant prepared floor plans showing this suggested layout of the shop. These plans were then submitted to the committee of machine-shop teachers for criticism; and, based on their suggestions, a final plan was evolved and approved by the principal and teachers of South High.

The last stage in the preparation was writing up the specifications for the new machines and enumerating the alterations needed in the shop itself. Requisitions and work order requests had to be made out for all of these items.

Thus it can be seen that through the co-operative efforts of the consultant, principal, and teachers complete plans were all ready months in advance of the time when funds were made available for the renovation.

The accompanying floor plan shows graphically the results of our combined deliberations, and the table gives the types and sizes of the machines provided. By using smaller machines wherever possible, the essential operations could be taught, the cost reduced, and much space saved since the shop itself could not be enlarged.

At the same time, a few larger machines give opportunity for instruction to those boys who may have definite vocational objectives and to take care of the occasional larger jobs which always come into the shop. Two small drill presses and two small grinders are provided in an effort to eliminate bottlenecks when several boys want to touch up tool bits or use a center drill at the same time.

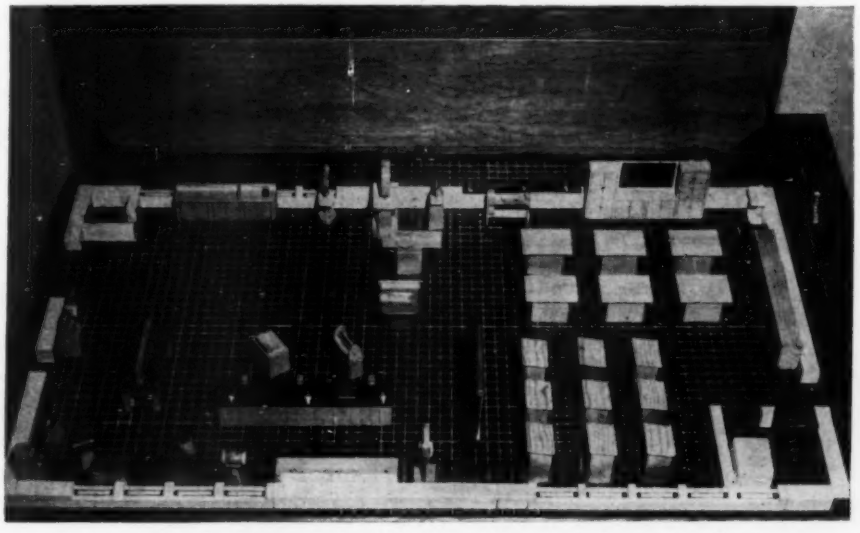
The three larger lathes are all provided with the usual tool room equipment including collet and taper attachments so that all operations can be taught to advanced students.

Once the authorization for remodeling was given, the work proceeded rapidly. As soon as school was out in June, the shop was completely dismantled, the War Surplus machines being placed in temporary storage, and the old machines and equipment sold for whatever they would bring — mostly junk prices. Then the old floor was ripped out, and the necessary remodeling and patching done on the walls; and after the electricians had laid their conduits to the locations for the new machines, a new concrete floor was installed. This floor was treated to prevent raising dust and painted dark red.

The next step was the installation of acoustical tile over the entire ceiling to help in keeping down the noise level. The painters then took over and the walls were given a light green tint with a darker green wainscot. Finally, fluorescent lights were provided throughout the shop which give adequate illumination by day or night.

As the new machines were delivered, they were immediately moved into place, leveled up and bolted to the floor, making everything ready for the electricians to come in and complete their connections.

By September when school opened all was in readiness as shown in the photographs, and the students moved into a new shop in which they could be trained on modern machines for the first time in many years. It bore little resemblance to the one they had last seen when they left school in the spring. It will be an inspiration for better work in the years to come. While we realize fully that it is far from perfect we feel that we made the best possible use of the available space.



Layout of the General Shop, Mauston, Wis., John Austin Woolley, Menomonie, Wis.

Promoting Industrial Education

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We are living in an age where it is necessary to sell modern education. This also applies to industrial education programs. Promoting is a selling job. In order to sell something the item must be good. If the item is superior it may even sell itself. Following are some factors to consider in selling industrial education, which includes both vocational-industrial education and the industrial arts.

Industrial education programs of today must be sold to the pupil, the parent, to industry, to business, to school administrators, and to the community. In this respect the instructor of shop subjects must be more than a teacher for he must also be a salesman to sell his wares effectively. What does it take? The superior instructor of the present and future should understand and believe in changing concepts and objectives; he should apply sound practices in group dynamics, visual aids, and good public relations.

Industrial Implications

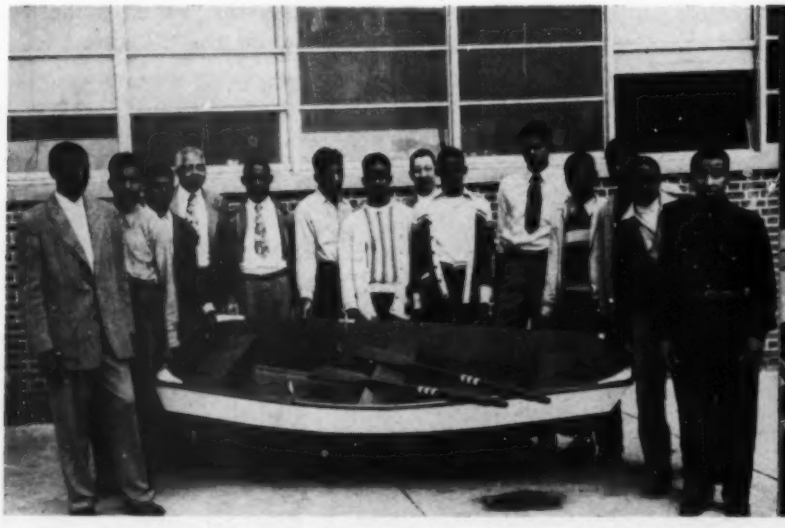
We are living in an age of changing concepts; changes of various sorts are usually necessary to progress. What have been some of the significant industrial changes which affect industrial education? There has been a change from unorganized industrial research to organized research on a large scale. The atomic age has come into being with almost unlimited possibilities in warfare and living. This atomic technology has already resulted in the need for more education and training. We are living in a period of inventions as exemplified through atomic energy, television, and electronics. There has been a growth in industrial production through scientific applications. We are living in a shrinking world as a result of developments in transportation and communication. Concepts in industrial education are changing as a result of these unprecedented technological advancements.

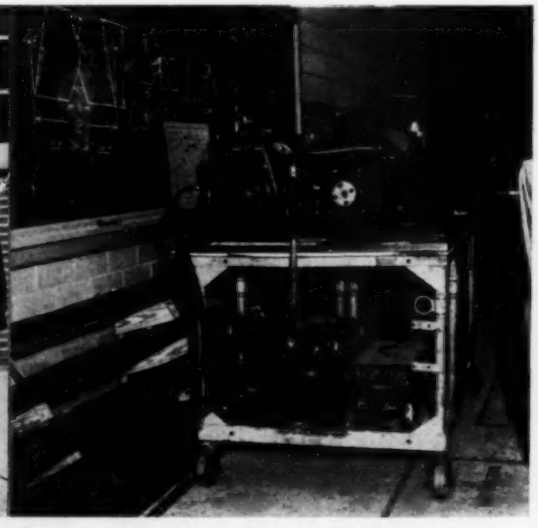
Group Dynamics

The word dynamic means — forceful, energetic, changing motion. We live in a world of group activity. The process of a progressive group of shop instructors working co-operatively and effectively toward a common goal is an example of group dynamics. Teaching a class successfully is group dynamics. In Figure 1 is shown a boat that was built as a group project in one of our schools by industrial-arts pupils. It was launched with appropriate ceremonies as a whole school project. Frequently what we accomplish we do through others; each person plays a part and the parts fit into a pattern to make up the whole.

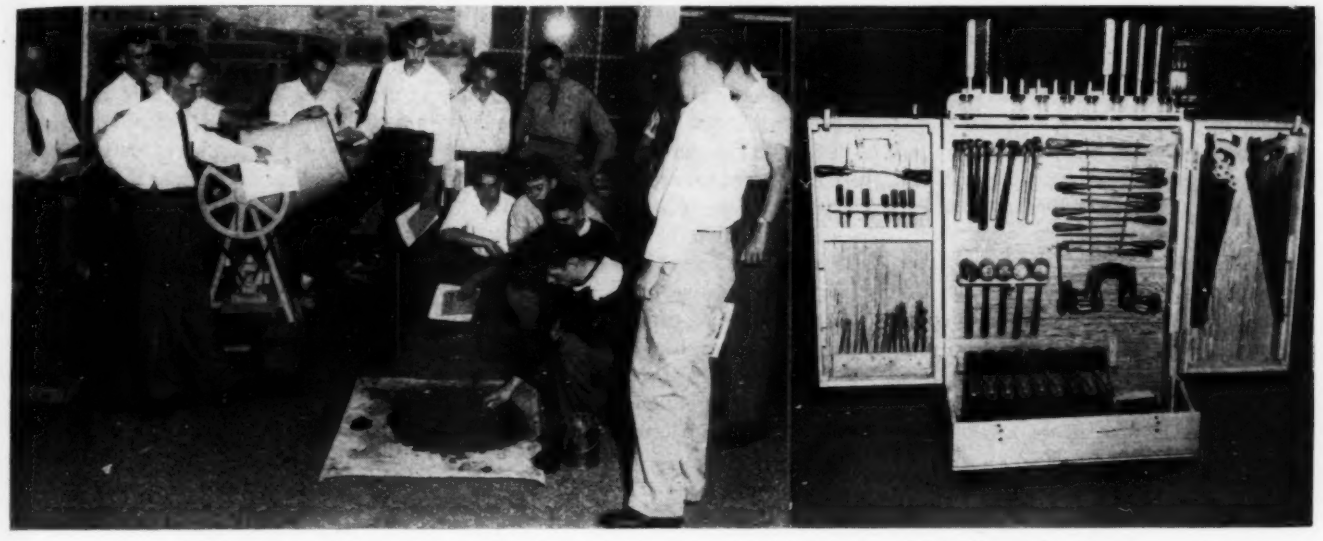
Group dynamics involves careful and continual planning. A program of progress is planned for each day, week, month, and year. In many cases as soon as there is a let-up the program of action becomes stagnant.

In the dynamics of shop teaching there should be continual change in projects, bulletin board materials, courses of study, activities and assignments in order to help meet preconceived objectives.





(Left) Fig. 1. A rowboat built as a group project; (right) Fig. 2. A movable gas engine testing frame



(Left) Fig. 3. Short course in industrial concrete; (right) Fig. 4. Portable tool cabinet

The procedures in group dynamics should be democratic, but leadership and direction are needed. Group thinking ultimately crystallizes into middle of the road planning which is probably the expedient path to follow from where we are to where we want to go. Weaknesses, uncertainties, and problems are usually the considerations, but topics of growth, achievement, and inspiration are also important. Topics are generally determined through survey, questionnaires, visitation, observation, and conference.

Flexible Programs

The word flexibility means — pliant, supple, elastic. In industrial education subjects the applications should be to philosophy, objectives, courses of study, subject offerings, facilities, and especially to meeting individual pupil needs.

In an industrial-arts general shop, gasoline engines are mounted on a movable frame, as shown in Figure 2, which can be wheeled outside of the shop for testing purposes. In vocational auto mechanics a hard blacktop surface outside the shop adds to the total working area. A high school unit woodshop can also have activities in patternmaking, plastics, and ceramics. A unit machine shop can have additional offerings in foundry, sheet metal, art metal, welding, heat treating, and metallurgy. A rowboat can be built as a group project, but does not have to be repeated each year.

Industry can be brought to the school: A local concrete industry sent two instructors to several of our high schools to teach a two-week course in concrete. See Figure 3. They even provided the materials and machinery. Each course was followed up with a practical project as a sidewalk and shuffleboard court. A field trip was arranged to the plant of the sponsor and to several concrete construction jobs. Why did the sponsor do this? To get favorable publicity and to interest boys in possible employment in their plant.

We can think of something portable as being flexible. Examples of this thinking are portable blackboards, portable bulletin boards, or the portable tool cabinet shown in Figure 4. Then, too, there is the idea of movable partitions and walls, especially for general shops.

There can be good teaching with minimum facilities but adequate facilities can make good teaching better.

Good Public Relations

In this day and age we should tell and show people what we are doing and we should do it continually. There are cases in large schools where some of the academic faculty are not aware of what goes on in the school shops. In one of our high schools a general metals instructor set up a fine display of art metal projects in the school corridor show case near the office. An academic teacher exclaimed, "I had no idea that the boys did work like that in the shops!" There seems to be this same lack of information outside of the school. We are all too inclined to take things for granted.

A superior job of teaching sells the instructor and his course; several outstanding teaching jobs sell the program. Pupils, parents, and the community must be shown.

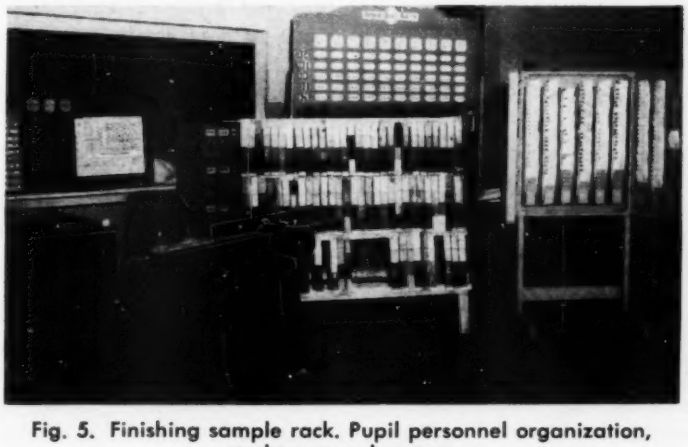


Fig. 5. Finishing sample rack. Pupil personnel organization, student record system

Good public relations is keeping others well informed. People are inclined to remember what they see, so, all forms of visual aids, project panels, charts, displays of quality projects can be excellent motivating and advertising devices.

The organized planning and learning that should take place during the construction of the project is what really counts. Figure 5 may be taken as an example. Naturally, the project should have justification and should represent the pupil's best effort. This learning should help prepare the pupil for life. Besides giving him information on "how to do," he must learn how to get along with others, and develop proper attitudes, ideals, and appreciations.

We have had several successful pupil participation exhibits in several of our schools. These are held in the school shops from 7 p.m. to 8 p.m., preceding a regular P.T.A. meeting, and are advertised beforehand. Parents and others visit the shops and see their boys at work as well as exhibits of representative projects and visual aids. This is an excellent example of effective public relations.

Other means of promoting good public relations in industrial-education subjects are newspaper and school paper items, talks before organizations and service clubs. Publicity on group projects, work experience programs, and new course offerings can be effective. Experimental centers in the industrial arts can add to the success of a program by initiating and trying out new ideas.

Conclusion. Industrial education should be sold to all concerned: to the pupil, the parent, the community, industry, the faculty, to business, and to the school administrators. This can best be done through adequate programs and superior teaching. In addition there is a need for understanding and application through topics such as — objectives, concepts, group dynamics, flexible offerings, and good public relations. Change is necessary to progress.

A Method of Grading Laboratory Work in Physics

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The matter of recording a correct grade for a student's achievement in laboratory work of any kind is always a problem. If the written material is done outside of the laboratory, there is bound to be a lot of plagiarizing, and also, it is hard to know just how much of the material presented is really understood by the students. The physics department of The Stout Institute has experimented with a number of different procedures for a number of years. The following is the one which this department has found to give the best results for the students taking this work at Stout.

The Instruction Sheet

First, each individual student obtains an instruction sheet which has been set up previously by the instructor. This instruction sheet is broken down into the following parts: the objective, the theory involved, a form for recording data, the questions to be answered, a list of materials and apparatus to be used, and the procedure to be followed. The procedure is usually given in several parts. Each student answers the questions on a separate sheet, or sheets. These questions, of course, include not only facts to be named, but also the deductions made by the student concerning the theory and the principles involved. The subject of the sentences need not be repeated, so as to save time for the student.

When the student enters the room, he is given his instruction sheet, after which he passes to his previously assigned table. He reads his sheet through very carefully, and follows any extra instructions which the instructor may have placed on the board. He then proceeds to gather his material, and goes ahead with the procedure.

We have enough apparatus and material for many experiments so that each student works individually. When such is not the case, we preferably use groups no more than two. The instructor is on hand to help the individual student over the rough spots. When the instruction sheet has been written properly, and the class is up to average, this *help* becomes general supervision, rather than a special help period. As the student is performing the experiment according to directions given, he answers the questions, and endeavors to note and calculate results, and draws his conclusions, and takes all necessary notes. As soon as the student has completed the manual work, he returns the material, and proceeds immediately to answer the questions which have been asked for that particular day.

Assigning Questions

Now, here is where we have a few differences as compared with many procedures in other colleges. The instruction sheet usually lists as many as 20 questions. The instructor will have chosen a certain vital number of the questions as being the most important for the student to be able to answer correctly. The numbers of these questions, or items, are written on the board. It is these items which the student endeavors to answer during the actual laboratory period. If

he completes the answers to these items before the close of the period, he does not need to hand in the answers to the rest of the items. If he does *not* complete the answers to the questions given on the board, he is required to hand in the entire list of answers to all of the questions when he returns for the next laboratory period, this being at the beginning of that next period.

Just as soon as the next period begins, the students are handed a test on the previous experiment. This test covers all of the items on the sheet originally handed the student. This, we have found, is the most valuable part of the entire laboratory checkup. It serves to keep the students *on their toes*. They know that they will be held for the results of the entire experiment. They know they must be able to pass each one of these tests satisfactorily, for by passing these tests, they will have obtained a much more thorough knowledge of the work which they have performed.

Leaders in Industrial Education

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(*Continued from page 45 of the February, 1952, issue*)

GEORGE EDMUND MYERS (Concluded)

Vocational Schools in Germany

The controversy over "unit versus dual control" waged heatedly for several years, beginning in about 1908. A large part of the agitation for separate or dual control came from educators and others who visited vocational schools in Europe, especially in Germany, and brought back glowing accounts of the efficiency with which these schools were managed. Prominent among these was Edwin G. Cooley, who had served several years as superintendent of schools in Chicago, and who was sent to Europe by the Commercial Club of Chicago to make a firsthand study of vocational schools. Dr. Cooley was convinced by his observations that separate and independent control of vocational education was indispensable to economy and efficiency, and he was an earnest and vocal advocate of this plan of administration.

Dr. Cooley made an active campaign in Illinois, and was successful in having a bill embodying his ideas introduced in the 1915 legislature. Two other bills were before the legislature at the same time. One of these was known as the "Blair" bill, because of its advocacy by Dr. Francis G. Blair, then state superintendent of public instruction in Illinois. It was also known as the "teachers'" bill, because it was backed by the public school interests of the state. The committee on education of the assembly held several public hearings, but failed to report any one of the bills. Lack of agreement among the advocates of the new legislation was commonly understood to be the explanation for the refusal of the committee to recommend action.

Following this setback the agitation for independent control began to subside. By the end of 1916, developments seemed to warrant the conclusion that there was "noticeably less interest in the unit-versus-dual-control controversy, the preponderance of opinion appearing to be against the organization of special independent boards for the control of vocational education. . . . It seems even more certain now than it did a year ago that the popular demand will be irresistible that vocational education be developed in connection with, and as a part of, the public-school system."[5]

Significant Analysis

The lapse of 35 years, the ravages of two world wars, and the upheavals of two devastating revolutions, have wrought such changes in Germany that Dr. Myers' report arouses no more than academic or historic interest at the present time. Nevertheless, it was regarded as highly significant by his contemporaries, because, more clearly than some other commentators, he showed: (1) that the dual character of the German system was not necessarily the reason for its success in Germany; (2) that the alleged superiority and efficiency of the German system was more or less illusory, when viewed in the light of what we expect our public school system to accomplish for children in the United States; and (3) the fallacy of the conclusion that because a plan of organization and administration seemed satisfactory in Germany it would prove equally acceptable and effective in the United States.

Dr. Myers pointed out that in order to understand conditions in the German schools of 1915 it was necessary to remember that "the German elementary school system dates back to the Reformation, and has centuries of tradition back of it, and (that) its administrative and executive personnel changes very slowly." Consequently, when the industrial education laws of the several German states went into effect, there was nothing like the flexibility and adaptability to change with which we are familiar. It is not surprising, therefore, that the control of the industrial schools was transferred from the ministry of education to the ministry of commerce and industry.

[5]Bawden, *Vocational Education. Report of the Commissioner of Education*, for the year ended June 30, 1916, Vol. 1, Chap. IX, pp. 143–175. Government Printing Office, Washington, D. C.

"One effect of dual control has been to hinder adjustment of the elementary school (in Germany) to present-day needs through introduction of industrial arts and the appeal to vocational interests. . . . The elementary schools fail to make use of these important factors in geography, language work, arithmetic, history, and other subjects. Elementary teachers, with rare exceptions, do not believe in things industrial or vocational in the elementary school; this is the place for the 'fundamentals' of education, with a traditional definition of 'fundamentals.' . . . From the state minister in charge of education down to the humblest local official, it is understood that vocational education belongs to another department of the government. The usual school authorities are not expected to concern themselves about it. It is noteworthy that manual training, which American educators measure more in educational than in vocational values, is taught in very few Prussian elementary schools."

Opportunity for Individual Progress

One of the undesirable features of the Prussian educational system at the period of this report, from the standpoint of students of education in the United States, was that it effectually closed the door of opportunity to that large number of boys — 40 per cent according to one set of figures — who were obliged to seek employment in unskilled occupations. In Berlin, "a city ordinance was passed in 1905 making attendance at continuation school compulsory for all male industrial and commercial employees from the time they leave the elementary school (usually at about the age of 14 years) until their seventeenth year is completed . . . for not less than four nor more than six hours of instruction per week." Three types of continuation school were provided: industrial schools, for apprentices and other workers in the skilled and semiskilled trades; commercial schools, for those employed in stores, offices, and other business occupations; and general continuation schools, for all those employed in unskilled occupations, including office boys, errand boys, shop helpers, house servants, and pages.

Of these boys in the general continuation schools, "the majority go into unskilled occupations because they offer better wages at first than can be earned in apprenticeship. A few do not have the ability or persistence necessary to learn a skilled trade. Many bright and capable boys are obliged to take these jobs because the wages they can earn are necessary for the support of the family. Once one of these boys enters an unskilled occupation, it is next to impossible for him to break away from it." The economic pressure of family need was not likely to be relaxed during this period of compulsory attendance at the school for unskilled workers, and attendance at this school would prevent the boy from preparing to enter a skilled trade by enrolling in the appropriate school. He would not be permitted to enter an industrial school, in any event, for apprenticeship in one of the skilled trades was an essential condition of admission. He would not be permitted to enroll in one of the voluntary evening schools, because he could not meet the requirement of employment in the trade taught. These features of the German system, which were not played up in some of the reports from Europe, certainly would not find congenial acceptance in the American plan of public education, one of the major ideals of which is to keep opportunity open at the top.

The University of Michigan Period

As already noted, Dr. Myers served as supervisor of continuation classes in the public schools of New York City during the following three years, 1914–17.

In the fall of 1917, he was appointed professor of vocational education and guidance at the University of Michigan, Ann Arbor, which position he held up to the time of his retirement from active duty, in February, 1942.

It was the services rendered and the achievements accomplished during this period of 25 years for which Dr. Myers will long be remembered. During this period he developed at the University of Michigan a department of vocational education, and more particularly a program of graduate studies, that ranked among the leading five or six sources of preparation for teachers and supervisors of industrial arts, industrial education, and vocational guidance in the United States. In addition to the preparation of specialists in these fields, he made a major contribution to the understanding of the philosophy and functions of these so-called special fields on the part of general school administrators, superintendents, and principals of schools, who enrolled in large numbers in lecture and seminar courses organized especially for them.

Michigan Society for Vocational Education

Shortly after his appointment at the University of Michigan, Dr. Myers began a study of industrial arts, home economics, and guidance in the elementary and secondary schools in Michigan, and soon became one of the best informed men in the state. Many teachers and supervisors of these subjects came to the University for graduate study, and returned to their communities with new concepts, new objectives, and new enthusiasm for their work. Many others were reached through extension classes.

Through his wide acceptance among the leaders in various sections of the state, he took the initiative in organizing the Michigan Society for Vocational Education, and served as its first president, in 1922. He was twice re-elected, serving as president from 1922 to 1925. Later he served three terms as chairman of the executive committee. The Society quickly became known as one of the best organized and most effective among the state associations for vocational education.

Dr. Myers was a prominent leader in a number of other professional organizations, including the Michigan State Teachers Association, the National Education Association, the Vocational Education Association of the Middle West, the American Vocational Association, the American Vocational Guidance Association, of which he served as president one term, 1931–32, and member of the board of trustees two terms. He was an active member of the American Association of School Administrators. He is generally credited with having made the original proposal that resulted in the formation of the American Association of Industrial Teacher Trainers. He took the lead in its organization and promotion, and served two terms as its first president, 1937, 1938. It is worthy of note that as president he insisted that one session of each annual meeting should be devoted to the consideration of reports of research projects in the field. He was an active member of the Manual Arts Conference of the Mississippi Valley from 1918 to 1942.

The Problem of Vocational Guidance

Dr. Myers has made a distinguished contribution as an author, including many articles published in educational journals, and reports of studies and investigations. In addition to his report on *Vocational Education in Germany,* referred to above, his next important book dealt with vocational guidance.[6] This book came out after he had devoted approximately ten years to the development of undergraduate and graduate courses in the subject at the University of Michigan. The movement for vocational guidance as we know it today traces its beginning to 1908, with the organization of the Vocation Bureau in Boston, sponsored by the Civic Service House, with Frank Alvah Parsons as director. During the succeeding 40 years an enormous literature has been produced, many elaborate plans and programs have been developed, and a multiplicity of concepts, principles, objectives, and methods have found expression.

Prominent among the leaders and exponents who have arisen, Dr. Myers has accepted and recommended the term, "vocational guidance," as best expressing the chief spirit and purpose of the movement. There have been some who object that this term presupposes a narrow view of the situation and the problem calling for solution. Some of these authorities have urged the adoption of "guidance" as a more acceptable term.

In discussing this point of view, Dr. Myers insists that vocational guidance, properly conceived, includes much of what is usually included under "educational guidance." At the same time, he concedes that there is a legitimate place for the latter. Educational guidance necessarily deals with the abilities, aptitudes, interests, and limitations which influence vocational choice, and proposes to aid the individual in planning an educational program which will contribute to the realization of this choice. Apart from its relation to the choice of a career, or to preparation for such career, it is difficult to speak clearly and intelligibly of the contribution that "educational guidance" offers to the individual. "It has seemed wise, therefore, not to give special consideration to educational guidance (in this book), but to assume that it will receive adequate attention in a comprehensive program of vocational guidance."[7]

Consistently with this point of view, Dr. Myers' book includes a chapter on "The Contribution of Elementary Education to Vocational Guidance," and another on "Occupational Exploratory Experiences in Junior and Senior High Schools," as well as chapters on "Counseling," "Placement," and "Standardized Tests," in his over-all treatment.

Types of Guidance

Elsewhere Dr. Myers recognizes at least three general types of guidance: vocational, educational, and recreational, and urges students of the subject to clarify their thinking and their use of terms. "The term guidance has been used in recent years to cover a multitude of school activities. In fact, some writers have practically identified guidance with education, and many school administrators are responsible for so-called guidance programs in their schools which include very little that has not in the past gone under the name of education."[8] He expressed the view that guidance without some qualifying adjective is an abstraction. "One is not just guided. One is guided with reference to some choice or adjustment that he is called upon to make, and these choices are concerned with specific interests, such as the vocational, educational, or recreational, or with two or more of these in combination."

He therefore discusses vocational guidance as a process of aiding individuals to make the choices and adjustments that are significant for their vocational progress, and educational guidance as a process of aiding pupils in making choices and adjustments that are significant for their educational progress. In each case, guidance is concerned with two groups of differences. Vocational guidance is concerned with differences among individuals on the one hand, and differences among possible occupations on the other. Similarly, educational guidance is concerned with differences among individual pupils, and differences among the various educational opportunities and curriculums available.

Principles and Techniques

Dr. Myers' latest contribution to the literature of the field of his major interest was published about a year before the date of his retirement.[9] In this book, he adopts and recommends the general acceptance of the definition proposed by the National Vocational Guidance Association, which was originally formulated in 1921, revised in 1924, in 1930, and again in 1937:[10]

"Vocational guidance is the process of assisting the individual to choose an occupation, prepare for it, enter upon, and progress in it. It is concerned primarily with helping individuals make decisions and choices involved in planning a future and building a career — decisions and choices necessary in effecting satisfactory vocational adjustment."

Myers examined the works of the leading authorities who had contributed to the discussion up to that time, and analyzed the various kinds or types of guidance recognized. According to the particular authority consulted, there were four, or six, or ten, or more kinds of guidance. In fact, he cited one speaker who declared that there were "at least 17 different kinds of guidance," and another who read a paper at a national convention entitled, "Fifty-seven Varieties of Guidance."

To all these Dr. Myers applied the criteria which he had put forward in earlier discussions, namely, the requirement that there must be two sets of differences involved in any situation or process to justify the use of the term guidance: (1) differences among the individuals concerned, and (2) differences among the choices confronting the individual. If a situation or process does not meet these two requirements, it must be rejected as a form or variety of "guidance," and called something else.

To illustrate his line of reasoning, consider "civic guidance," which is listed and discussed by several authorities under such designations as "civic and moral guidance," "guidance for citizenship," "civic-social-moral guidance." If these terms are understood to refer to the process of aiding the individual to choose, prepare

[6] George E. Myers, *The Problem of Vocational Guidance* (New York: Macmillan, 1927), cloth, 318 pp.

[7] Myers, *op. cit.*, page vi.

[8] George E. Myers, *Relation of Industrial Arts to Guidance.* Chapter III, in *Industrial Arts in Modern Education,* by Bawden and Others (Peoria, Ill.: The Manual Arts Press, 1934), p. 49 (out of print).

[9] George E. Myers, *Principles and Techniques of Vocational Guidance* (New York: McGraw-Hill Book Company, 1941), cloth, 389 pp.

[10] The Principles and Practices of Educational and Vocational Guidance. Report of the Committee of the National Vocational Guidance Association. *Occupations: The Vocational Guidance Magazine,* New York, Vol. 15, May, 1937, pp. 772–778.

for, enter upon, and progress in civic activities, it must be objected that "most of these activities in which people are expected to engage are the same for all members of the community — for lawyer Jones and plumber Smith and farmer Brown. The obligation rests equally upon all to observe the laws, to show respect for constituted authority, to live peaceably, to vote, to bear arms if necessary, and to perform other common duties expected of every good citizen." There do not appear to be numerous courses of action among which the individual is expected to choose, rejecting or avoiding others. It cannot be shown that there are many different kinds of civic conduct, all good in themselves, about which the individual should be informed, and among which he is expected to make a choice particularly adapted to his personal qualities or characteristics. "The problem which confronts the schools in relation to civic conduct is that of bringing about the same result, as nearly as possible, in all pupils, differing as they do in intelligence, personality, home environment, and previous education in civic matters. This is a matter of education," and not guidance.[11]

In a similar manner he disposes of what is called "health guidance," by showing that there are not, in fact, several different varieties of health, among which the individual is to make a choice. "If the word 'education' is substituted for the word 'guidance' in these discussions, the material reads equally well, and seems to mean the same." What is needed is the inculcation of habits of exercise and attention to the laws of health. "Most educators consider this an educational job and would prefer so to label it." It is recommended that guidance be not used as a synonym for education.

After examining the various proposals, and applying the criteria suggested, Myers concluded that there is justification for recognizing four types of guidance: vocational guidance, educational guidance, recreational guidance, and community service guidance. Clear thinking seems to require that the remaining processes or methods be thought of as processes or methods of education rather than guidance.

Other Publications

In addition to the books which have been mentioned, and a multitude of articles contributed to professional and technical journals, reference should be made to two books which have been widely read and studied: *Planning Your Future*, 559 pages, 1930, the third edition of which was published by McGraw-Hill Book Company, New York, in 1940; and *Moral Training in the Schools*, 1907. In the writing of these two books Dr. Myers collaborated with groups or committees of distinguished authors.

Personal

Dr. Myers is a man of about 5 ft. 10 in. in height, and weighs perhaps 150 lb. He has a very agreeable and likable personality, and was highly regarded by his students and associates at the University of Michigan. He was very effective as a speaker in the classroom, in conferences, and in committees. In these various relationships he was a significant force in the many professional organizations to which he devoted his interests and energies. And in these ways he made his leadership count.

For a period of about 24 years, 1918 to 1942, we met rather regularly, perhaps three or four times each year, at educational conventions and conferences in which we were both interested. Among the most enjoyable of these were the annual meetings of the Manual Arts Conference, in which we were more or less closely tied up for two or three days. I remember particularly the meeting at the University of Michigan, in December, 1921. Through Dr. Myers' influence we held our meetings, and the members of the Conference were housed, in the new Student Union Building, recently opened.

Other occasions that stand out in my memory were at meetings of the Michigan Society for Vocational Education, at which I saw Dr. Myers in action, and observed at firsthand the evidences of the thorough manner in which the machinery of that Society had been set up, and the effectiveness with which officers and committees functioned.

Another delightful meeting occurred at the opening of the Summer Session at Kansas State Teachers College at Pittsburg, in 1942. I saw a newspaper report that Dr. Myers had accepted an invitation to serve as guest professor in the summer session at the University of Colorado, at Boulder. Knowing that he might pass through Kansas City on his way to Colorado without going too far out of his way, I wrote to inquire about the possibility, and to invite him to make a side trip and visit our department at Kansas State Teachers College. When he accepted, I set the machinery in motion to advertise his visit, and to arrange a dinner in his honor at the College, which occurred on Wednesday evening, June 3, 1942.

Invitations went out to superintendents and principals in the territory, and we were able to greet him with a fine audience which included visiting educators, undergraduate and graduate students, and representatives of the faculty, including a few survivors of the 1911–13 period, when Dr. Myers was principal. In addition, President Hughes invited Dr. Myers to address the students and faculty at the first assembly of the Summer Session on the following morning, June 4.

For the past two years, 1950, 1951, Dr. Myers has been spending the winters near Jacksonville, Fla., where he has been doing some work in a research laboratory that is concerned with problems of aging. He recently completed a survey of homes for old people in Florida that is being used by the Florida State Welfare Board in planning for the licensing and supervision of such homes in that state.

Our most recent meeting was in Pittsburg, Kans., on Friday, June 1, 1951, when Dr. Myers paid a short visit to Kansas State Teachers College. I had just completed the first draft of the *History of Kansas State Teachers College*, and had the satisfaction of submitting to him then and there, for examination and approval, the manuscript of Chapter VI, in which I discuss his administration as the second principal of the school.

(To be continued)

When George Lewis, past national president of the F.F.A. (Future Farmers of America) was chosen to make a trip to Japan under the auspices of the Japan International Christian University Foundation of New York, he was surprised to be received on his arrival at Japan by Takyumi Kosugi, national president of F.F.J. (Future Farmers of Japan).

Evidently the youth of the two countries are doing their part in improving *human relations*.

[11] Myers, *op. cit.*, p. 27.

Industrial Arts and Vocational Education
John J. Metz, *Editor*

THINGS TO REMEMBER FOR MARCH

The American Red Cross will ask the people of the United States, during the month of March, for 85 million dollars to carry on their work for this year.

The amount asked for may seem staggering, but anyone knowing what this great organization has done in this country during peacetime and wartime, will do his utmost to assist in helping to meet the quota asked for.

Many who served in the armed forces during World Wars I and II know what the American Red Cross meant to those engaged in these struggles. It is well to remember, however, that this organization does a great deal more than render assistance to those in military services.

Every year there is need for the Red Cross to render assistance to communities that have been visited by fires, tidal waves, earthquakes, storms, floods, and the like, and the assistance required runs up into millions.

Can we refuse to help them then when they come to us for financial aid? And can we help the movement by making a strong appeal to our students? Let's do it.

Another March undertaking is the *Save Your Vision Week,* March 2–8.

Unfortunately, not all our classrooms are well lighted. As a matter of fact, the American Optometric Association holds that classrooms are the cause of many children's eyesight problems. Studies based on millions of cases show, that while only one child in five, attending in old-fashioned classrooms, has eye troubles when he enters first grade, the proportion rises to as high as three in five in the eighth grade.

To assist those who want to do something about this, Dr. Lois Bing, chairman of the association's school vision committee, gives the following major requirements for a good visual environment.

1. Plenty of light, evenly distributed with no part of a room more than four times as bright as any other.
2. Pastel walls and ceilings which reflect rather than absorb light.
3. Pastel chalkboards in the place of the old-fashioned, light-absorbing blackboards.
4. Seats and desks which fit the child so that he can sit properly and make the best use of his visual environment.
5. Furniture should be light, without any shiny surfaces, to avoid sharp contrasts between desks and visual tasks.

The foregoing pointers show the uninitiated what must be done to improve the visual environment in his own classroom or shop.

The American Optometric Association also furnishes the following definitions which may interest both shop teachers and their students.

"*Optometry* is the only profession specially licensed to care for vision. It is licensed in all 48 states and the District of Columbia.

"*Oculists* are physicians who specialize in vision care. Any physician may call himself an oculist; no special training or state examination in vision care is required of him, as is required of the optometrist.

"*Ophthalmologists* who belong to the Academy of Ophthalmology are physicians who have specialized postgraduate training in the medical aspects of eye care. They usually specialize in eye surgery and treatment of eye diseases.

"*Opticians* fill prescriptions for glasses, as pharmacists fill prescriptions for drugs. Opticians are not licensed in most states and may not make eye examinations or prescribe glasses.

"An *optometrist* is required to have five years of specialized training at the college level to be eligible for a state license examination. Optometry is taught in ten universities and colleges approved by the American Optometric Association."

Shop teachers are confronted by a real duty — they must interest their students in safeguarding their eyesight.

ANNIVERSARIES

Abraham Lincoln's and George Washington's birthdays, both legal holidays, are becoming more and more merely special names for certain days to most Americans. Even the schools are getting lukewarm in placing any special emphasis on the celebration of these events.

Probably the reason for this is that present-day statesmen? ? ? no longer wish to have these names arise as Banquo's ghost to remind them that at one time there were men who took their civic duties as opportunities for doing the very best for the people of our country, and not as chances to grasp powers that deprive people of their legal rights or to play one group against another.

Probably it is well that these anniversaries, that at one time were celebrated with great style, should gradually fade out of the picture. We of the present generation no longer seem to be worthy of honoring such names as Washington and Lincoln, and in celebrating their birthdays we probably would be merely subscribing to a hypocritical show which no longer has any real meaning.

Dark as things may seem, however, we, to whom is entrusted the education of the youth of America, should be especially careful not to let worth-while customs fall into disuse. At least we should remember that these anniversaries are to remind us of past glorious characters that may well set standards for our present generations.

INTERESTING FACTS ABOUT IRON AND STEEL IN UTAH

Steel Facts, a monthly periodical published by the American Iron and Steel Institute, in its latest issue carried the interesting story that scrap which was discarded by those engaged in the California gold rush of 1849 served a very important role in Utah about a century ago.

A forge which was set up in Salt Lake Valley to satisfy the need for domestic utensils and agricultural implements, utilized the scrap collected along the wagon trails of the "Forty-Niners." The forge found enough of this material to operate for about two years.

In the meantime iron-ore deposits were discovered in southern Utah, and later on iron ore and coal deposits were found at what is now Cedar City, Utah.

A blacksmith made the first iron out of this ore in 1851, and in 1852 the settlers succeeded in making the first pig iron produced west of the Mississippi.

Steel making followed and now Utah has the largest blast furnace capacity, the twelfth largest steel output, and it ranks fifth in the production of plates and heavy structural shapes.

Teaching Materials For Industrial Education

CHRIS H. GRONEMAN

Head, Industrial Education Department
School of Engineering
The Agricultural and Mechanical College of Texas
College Station, Tex.

"Teaching Materials for Industrial Education" is a listing of free or inexpensive teaching aids compiled for use by teachers of industrial arts, trade and industrial, and technical courses. The purpose of this detailed listing is to assist them in making their offering in the educational field more vital, up-to-date, and broad.

Response to the original compilation was immediate and heartening, indicating that the extensive listing, as such, was of direct benefit to those individuals who wished to make use of any materials that would cause them to become better-informed educators.

The present list has been revised and expanded through direct inquiry to all industries, companies, or agencies who have interesting, helpful materials available for the asking, or for a minimum cost.

The thanks of the author are extended to all of these companies for the co-operation shown in forwarding the informative materials.

The many materials, numbering into the thousands, received and available were separated into three classifications: (1) bulletins and booklets, (2) charts and samples, and (3) films.

Notation is made on the listing where a charge is made for the material. In general, however, they are free, and because of this, when feasible, the person requesting such aid should furnish postage.

Bulletins and booklets are obtainable in the specific or general areas of drawing, electrical and communications, handcrafts, industrial and general, metal, plastics, professional, transportation, and woods.

Charts and samples, as well as films, are listed under these same headings.

The teacher or educator who browses through the compilation either hurriedly, or in detail, will be rewarded for the time spent by an enlightened and enriched understanding of the many helpful materials to be had merely for the asking.

BULLETINS AND BOOKLETS

DRAWING

American Lead Pencil Company
Hoboken, N. J.
Sketching with VENUS Pencils, with one free Venus Drawing Pencil, 25¢
Portfolio of Prize-Winning Pencil Drawings in 1951 Venus Scholastic Art Awards, with one free Venus Drawing Pencil, 10¢

Dick Company, A. B.
5700 West Toughy Avenue
Chicago 31, Ill.
How to Plan and Publish a Mimeographed School Newspaper
How to Give New Life to Your Mimeographed Paper
"Color-Light" Your Mimeographer School Newspaper
Handbook for the Mimeographer High School Paper
How to Use Mimeograph Color Inks

Dietzgen Company, Inc., Eugene
2425 Sheffield Ave.
Chicago 14, Ill.
School Catalog
Use and Care of Drawing Instruments

Eagle Pencil Company
703 East 13th Street
New York, N. Y.
Drafting Booklet

Higgins Ink Company, Inc.
271 Ninth Street
Brooklyn 15, N. Y.
Ink Sketching
Higgins Catalog Folder
A Biography of the Founder
History of Ink

Hunt Pen Company, Howard C.
Camden 1, N. J.
Speedball Elementary Alphabets, 20¢

Keuffel & Esser Company
Adams and Third Streets
Hoboken, N. J.
Drafting and Reproduction, Equipment and Materials Catalog
Graph Sheets, Co-ordinate Papers and Cloths
Leroy Lettering and Symbols
Elementary Instructions for Operating the Slide Rule
How to Use the Builders Level
Hand Level
Right Angles with Pocket Instruments
Drafting Instruments and Materials for Engineering Schools and Colleges

Pease Company, The C. F.
2601 West Irving Park Road
Chicago 18, Ill.
General Catalog
Pease 60-G Whiteprinting and Developing Machine
Pease Sheet Dryer
The Pease Continuous Automatic Whiteprinting Equipment

Post Company, The Frederick
P.O. Box 1091
Chicago 90, Ill.
Your Guide to School Buying — Drafting and Drawing Materials Specials

Sheldon, E. H. & Company
Muskegon, Mich.
Sheldon School Shop Equipment and Shop Plans

Speed-O-Print Corporation
1801 Larchmont Avenue
Chicago 13, Ill.
Dealer Catalog
Manual of the Duplicating Process
Copy Control

V. & E. Mfg. Company
Pasadena, Calif.
Vemco Drawing Instruments

Westinghouse Electric Corporation
306 Fourth Avenue
P.O. Box 1017
Pittsburgh 30, Pa.
Eight Principles of Kitchen Planning

ELECTRICAL AND COMMUNICATIONS

Allied Radio Corporation
833 West Jackson Blvd.
Chicago 7, Ill.
General Catalog
RCA Receiving Tubes
Teaching Radio Activity is Really Easy
You Can Prospect for Uranium with a "Super Sniffer"

American Telephone and Telegraph Company
195 Broadway
New York 7, N. Y.
The Magic of Communication
Alexander Graham Bell
Telephone Almanac

Association of Casualty and Surety Companies
Accident Prevention Department
60 John Street
New York 38, N. Y.
How Safe Is Your TV Antenna, No. I–134, 1¢

Bausch & Lomb Optical Company
Rochester 2, N. Y.
Milestones in Optical History (L–17)
B&L Honorary Science Award and Science Scholarships
Lens Coating (F–18)
Color Correction (F–134)
Photographic Optics (F–20)
Bubbles in Lenses (F–135)
Photographic Resolution (F–138)
The Care and Nurture of Coated Lenses (E1–739)
The Educational Focus (magazine for science instructor's use, free)

Breuer Electric Mfg. Company
5100 North Ravenswood Avenue
Chicago 40, Ill.
Breuer Electric Manual

Columbia Broadcasting System, Inc.
485 Madison Avenue
New York 22, N. Y.
Making Friends with the Microphone
A Memo for Prospective Announcers

DuMont Laboratories, Inc., Allen B.
Instrument Division
1000 Main Avenue
Clifton, N. J.
DuMont Cathode — Ray Equipment

Edison, Inc., Thomas A.
West Orange, N. J.
Edison — General Bulletin
For School and College Laboratories
Edison and His Storage Battery
Edison — Inspiration to Youth

Electric Storage Battery Company, The
Philadelphia, Pa.
Every Day in Some Way You Use an Exide Battery
The Storage Battery — Its Fundamentals, Use and Maintenance
Exide News

Electronic Instrument Company
276 Newport Street
Brooklyn 12, N. Y.
Teach Electronics Faster and Easier

Gearron Company, The
27 Desplaines St.
Chicago 6, Ill.
Lamp Kit Folder, 25¢

General Electric Company
1285 Boston Avenue
Bridgeport 2, Conn.
Electric Housewares
General Electric Appliances for Better Living

General Lighting Company
1527 Charlotte Street
New York 60, N. Y.
Catalog and Price List

General Motors
Educational Service
Department of Public Relations
Detroit 2, Mich.
Electricity and Wheels
Optics and Wheels
A to Zero of Refrigeration
Previews of Progress — The Story of General Motors Science Show

General Radio Company
Cambridge 39, Mass.
Industrial Noise
Quality Parts and Components for Electronic Equipment
Stroboscopes
Eyes for Industry, Stroboscopic Techniques
The Noise Primer

Hanovia Chemical & Mfg. Company
Chestnut Street & N. J. R. R. Avenue
Newark 5, N. J.
General Lighting Catalog

Hoover Company, The
North Canton, Ohio
Notes on Buying and Using an Electric Cleaner
This is the Way We Plan a Cleaning Equipment Closet
Notes on Buying and Using an Electric Iron

Illuminating Engineering Society
1860 Broadway
New York 23, N. Y.
The American Recommended Practice of Industrial Lighting, 25¢
School Lighting, American Standard Practice
Home Lighting, Recommended Practice
Office Lighting, Recommended Practice
Lighting Practices for Stores and Other Merchandising Areas
Street and Highway Lighting, American Standard Practice
Library Lighting, Recommended Practice
Daylighting, Recommended Practice, 50¢
Industrial Lighting, 25¢
Lighting for Machining of Small Metal Parts
Experiments With Light, 25¢
Lighting Fundamentals, Course, $1
Lighting Design Problems Course, $1.50
Lessons in Practical Home Illumination, 25¢
Testing Procedures for Illumination Characteristics, $1
Standard Method for Measuring and Reporting Illumination from Artificial Sources in Building Interiors, 10¢
Footcandle Survey Form (IS–10) for Artificial Illumination in Interiors, 2¢
Lighting Equipment Engineering Data Sheet, 25¢
Brightness Distribution in Rooms, 50¢
Residence Wiring Design Handbook, 25¢
Farmstead Wiring Design Handbook, 40¢
Lighting Principles and Practice
Guide for Lighting Data Sheets and Lighting Problems

Mallory & Company, Inc., P. R.
3029 East Washington Street
Indianapolis, Ind.
Manufacturer's Catalog
Guide to Mallory Mobilization Facilities

Maqua Company, The
Schenectady, N. Y.
Story of the Turbine
Atomic Energy in Our Time
Edison and Electricity
The Romance of Electricity
Steinmetz Latter-Day Vulcan
The Story of General Electric Research
Thunderbolts in Harness
Things I've been Thinking About
Motors Make the World Go Round
Adventures in Electricity, No. 7, A Story of Electronics
Adventures in Electricity, No. 6, The Story of Light
Adventure Into The Past
Adventures Inside the Atom, the Story of Nuclear Energy
Adventures in Electricity, X-Rays in Medicine, Industry and Science
Adventures in Jet Power
Adventures in Electricity, Distribution of Electricity
Adventures in Electricity, Uses of Electricity
Adventures in Electricity, The Generation of Electricity

National Broadcasting Company
Department of Information
RCA Building, Radio City
New York 20, N. Y.
How NBC Dramatic Radio Programs are Produced
Jog Inventory
Masterminding the Mike
Announcer's Qualifications
Duties and Qualifications of Broadcast Engineers
Job Opportunities in Television
Job Opportunities in Radio With The National Broadcasting Company

Ohmite Mfg. Company
4835 Flournoy Street
Chicago 44, Ill.
OHM's Law Calculator, 25¢

Radio Receptor Company, Inc.
Selectron Division
251 West 19th Street
New York 11, N. Y.
Characteristics, Applications and Design Factors, Selectron Selenium Rectifiers

Sams & Company, Inc., Howard W.
2201 East 46th Street
Indianapolis 5, Ind.
Photofact Radio and Television Technical Data

Shallcross Mfg. Company
Jackson & Pusey Avenues
Collingdale, Pa.
Shallcross Audio Attenuators

Sperry Gyroscope Company
Division of the Sperry Corporation
Great Neck, L. I., N. Y.
The Gyroscope through the Ages
Elmer's Gyros

Sylvania Electric
Advertising Department
Emporium, Pa.
Radio Symbol Guide, 35¢
Tube Characteristics Folders
Sylvania News
40 Uses for Germanium Diodes, 25¢
TV Tube Complement Book, 50¢

Underwriters' Laboratories, Inc.
207 East Ohio Street
Chicago 11, Ill.
Electrical Equipment List
List of Inspected Fire Protection Equipment and Materials
Lists of Inspected Appliances Relating to Accident Hazard, Automotive Equipment, Burglary Protection
Hazardous Location Electrical Equipment List
List of Inspected Gas, Oil and Miscellaneous Appliances
The Story Behind Underwriters' Laboratories, Inc.

United States Department of Commerce
National Bureau of Standards
Washington 25, D. C.
Safety Rules for the Installation and Maintenance of Electrical Supply Stations, No. H31, 10¢
Safety Rules for the Installation and Maintenance of Electric Supply and Communication Lines, No. H32, 75¢
Safety Rules for the Installation and Maintenance of Electric Utilization Equipment, No. H33, 20¢
Safety Rules for Radio Installations, No. H35, 15¢
Code for Protection Against Lightning, No. H40, 30¢
Static Electricity, No. C438, 10¢
Maintenance of Elevator Mechanical Safety Appliances, No. C442, 5¢
Information on Refrigeration, No. LC419
Domestic Electric and Gas Refrigeration, No. LC472
Electrical Measuring Instruments, meters, and their accessories, No. LC672

United States Office of Education
Superintendent of Documents
United States Government Printing Office
Washington 25, D. C.
Radio in Education
Experiment by schools, radio, and government, 20¢, Cat. No. 143.2: Ex. 7
FM for education, 20¢, Cat. No. FS 5.30: Ex. 7
Radio and Television, bibliography, 15¢, Cat. No. FS 5.3: 948/17
Vocational Education
Building electrical equipment for the farm, 20¢, Cat. No. FS 5.123; 209

Western Union Telegraph Company
60 Hudson Street
New York 13, N. Y.
The Story of Western Union

Westinghouse Electric Corporation
306 Fourth Avenue
P.O. Box 1017
Pittsburgh 30, Pa.
The ABC of Electronics at Work
Supplement to the Charts on Nuclear Physics, 10¢
How Does It Work?
How to Build an Electric Motor
The World Within The Atom
Highways of Wire
Fluorescent Lamps
Footcandle Tables
Adventures in Research
Westinghouse News
Highlights of Westinghouse
Electrical Farm Equipment You Can Build
Farmstead Wiring
Electrical Products for More Profitable Farming
Electricity in the Milkhouse
Productive Power on the Farm, 2¢ per copy (a series of four booklets)
Welding
Lighting
Heating Devices
Motors and Controls
Refrigeration and Home Freezing
Electric Household Refrigeration
Electrical Living — and How to Have It
Design Details for Electrical Living Homes
Electric Home Appliances, Teachers' Handbook
Electric Home Appliances, Students' Folder
Household Electric Ranges, Teachers' Handbook
Household Electric Ranges, Students' Folder
Convenient Tables and Formulae
Automotive Lighting Service Manual
Westinghouse Auto Bulbs
Small Motor Selector
Electrical Instruments, 50¢
Electronics Laboratory Manual, 50¢
Planned Sportslighting
ABC Plan for School Lighting
Save Our Sight
Illumination Design Data
The ABC of Electronics at Work

Weston Electrical Instrument Corporation
Publicity Department
Newark, N. J.
Suggestions for Teaching Selected Material from the Field of Electricity, Monograph Number Three, Bureau of Educational Research in Science, Teachers College, Columbia University

Willard Storage Battery Company
246–286 East 131st Street
Cleveland 1, Ohio
Willard Dry Batteries

The Wiremold Company
Hartford 10, Conn.
Catalog and Wiring Guide, No. 18
Plugmold — The Modern Way to Wire for Modern Outlet Convenience
Wiremold Aids to Better Lighting
New Swivelier "Channelites"
The Plug-In-Anywhere Wiring System
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Typical Telephone Installation
Wiremold No. 3000 as a Group Circuit Feeder
Wiremold Layout for Large General Office
Wiremold 2100 Layout for Blackboard Lighting
Wiremold 3000 Layout for Heavy Duty Multi-Outlet System

HANDCRAFTS

American Art Clay Company
4717 West Sixteenth Street
Indianapolis, 24, Ind.
Amaco Pottery Supplies and Equipment
Amaco Products for School Arts and Crafts

The American Crayon Company
209 Browder Street
Dallas 1, Tex.
Old Faithful Products of The American Crayon Company, No. 751-SR
Catalog of Art and Handicraft Books

American Felt Company
Glenville, Conn.
Felt Fancies
The Story of Felt
Better Teaching with the Felt Board

American Glassware Association
19 West 44th Street
New York 18, N. Y.
History of Glass

American Handicrafts Company, Inc.
45–49 South Harrison Street
East Orange, N. J.
Catalog of Craft Supplies

American Paper and Pulp Association
122 East 42nd Street
New York 17, N. Y.
The Paper Industry

American Type Founders, Inc.
Department of Education
Elizabeth B, N. J.
Printing Equipment Specification Folders

Argus Cameras, Inc.
Ann Arbor, Mich.
Argus, First Choice, Fine American Cameras
Screen Shows in Your Own Home

Berkeley Models, Inc.
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Brooklyn 22, N. Y.
Catalog and Hand book for Model Airplanes, Boats and Race Cars, No. 49, 25¢

Borden Company, The
Chemical Division
350 Madison Avenue
New York 17, N. Y.
Papercraft Projects

Botany Mills, Inc.
16 West 46th Street
New York 19, N. Y.
Your Woolens — their wear and care
Botany Brand — from little lambs to you
A Wool Primer — History and Uses of Nature's Noblest Fiber

Cambridge Glass Company, The
Cambridge, Ohio
The Art of Making Fine Glassware

Chicago Wheel & Mfg. Company
1101 West Monroe Street
Chicago 7, Ill.
Handee Tool of 1001 Uses
Chicago Wheel Manual
Miniature Boat Placque, Plan No. 506

Personal Glass, Plan No. 782
Novel Placques Easily Made, Plan No. 306
Alphabet and Numerals for Monogram Use in Glass Grinding, Inlaying, Carving, Plan No. 522
Quick Made Accessories for Model Makers, Plan Sheet No. 520
Totem Poles, Plan No. 605
A Carved Bowl of Rare Beauty Featuring a Chestnut Spray Design, Plan No. 502
River Boat "Amy Moore," Plan No. 525
Novelties from Coconut Shells, Plan No. 608
Handee Hobbies

Columbian Rope Company
Advertising Department
Auburn, N. Y.
The Story of Manila Fibre
How to Uncoil Columbian Pure Manila Rope
How Wrap and Tie a Package
Rope Knowledge for Riggers
Columbian Pure Manila Rope — How it is Made
Columbian Nylon Rope
How to Splice
The Care and Treatment of your Rugs
The Story of Sisal Fibre
The Columbian Rope is Made

Compressed Air and Gas Institute
1410 Terminal Tower
Cleveland 13, Ohio
Manufacturer of Toy Trains Utilizes Compressed Air

Coors Porcelain Company
Box E
Golden, Colo.
Chemical Porcelain Ware

Craftsman Supply House
Scottsville, N. Y.
Handbag Craft Supplies
"Me Too" Fashions

Eastman Kodak Company
Rochester 4, N. Y.
Equipment Catalog
Kodak Still Projection Equipment
Kodakroom Darkroom Aids

Electric Hotpack Company, Inc.
5077 Cottman Avenue
Philadelphia 35, Pa.
Kiln Assembly Bulletin

Foredom Electric Company
27 Park Place
New York, N. Y.
Flexible Shaft Machines Catalog

Glatfelter Company, P. H.
Spring Grove, Pa.
Forestry and Paper

Hammermill Paper Company
Erie, Pa.
From Spruce Tree to Writing Paper
Teachers Packet, 15¢
Students Packet, 10¢

Hammett Company, J. L.
Kendall Square
Cambridge 42, Mass.
Industrial Art and Occupation Therapy Supplies Catalog

Handcrafters, The
Waupun, Wis.
Peacock Lustro-Lace
Lumber-Jacket
Hobby-Knit
Peacock 6-inch Loom
Badgers
Cork-Cut-Outs
Peacock Craft

Harper Electric Furnace Corporation
39 River Street
Buffalo 2, New York
Electric Ceramic Kilns Descriptive Bulletins

Hunt Pen Company, Howard C.
Camden 1, N. J.
Block Printing with Linoleum, 50¢
Pen Tips on Cartooning, 50¢
Speedball Textbook, 75¢

Larson Company, J. C.
820 South Tripp Avenue
Chicago 24, Ill.
Larson Leathercraft Catalog

National Soap Sculpture Committee
160 Fifth Avenue
New York 10, N. Y.
Soap Carving in the Classroom
About Soap Sculpture

Ohio Leather Company, The
Girard, Ohio
The Story of Leather

O-P Craft Company, Inc., The
Sandusky, Ohio
Handicraft Handbook

Plymouth Cordage Company
North Plymouth, Mass.
Useful Knots and How to Tie Them
How to Put Rope to Work
Why "The Plymouth Story" is the Right Story of Rope Economy

Pratt Company, G. A.
1108 West Chicago Avenue
East Chicago, Ind.
The Pratt Bookbinding Unit — the machine that does it all

Proctor & Gamble Company
Cincinnati 1, Ohio
Soap Sculpture Manual

Russo Handicraft Supplies
245 South Spring Street
Los Angeles, Calif.
Leather and Craft Catalog, 25¢

Sheldon & Company, E. H.
Muskegon, Mich.
Sheldon Art-Studio Workshop Furniture

Southern Pacific Company
65 Market Street
San Francisco 5, Calif.
Locomotives of the Southern Pacific for Rail Fans and Model Builders

Speed-O-Print Corporation
1801 Larchmont Avenue
Chicago 13, Ill.
Dealer Catalog
Manual of the Duplicating Process
Copy Control

Speed-O-Print Corporation
Chicago, Ill.
Speed-O-Print Manual of the Rotary Stencil Duplicating Process, $1.50
Catalog No. 8
Sales and Management Co-Ordinator

Stokes Machine Company, F. J.
Philadelphia 20, Pa.
Manufacture of Compressed Tablets

Strathmore Paper Company
West Springfield, Mass.
Making Expressive Strathmore Papers

Tanners' Council of America, Inc.
100 Gold Street
New York 7, N. Y.
The Romance of Leather

Tester Chemical Company
Rockford, Ill.
Catalog of Cements and Model Supplies

Thayer & Chandler
910 Van Buren Street
Chicago 7, Ill.
General Catalog "Arts and Crafts for Hand Decoration"
1951 Catalog, "The Idea Book"

Tubbs Cordage Company
200 Bush Street
San Francisco 4, Calif.
Knots and Their Uses
Supercore Manila Rope
Marine Rope
Fishing Rope
Oil Well Cordage
Ski tow Rope
Pacord Twine

United States Office of Education
Superintendent of Documents
Government Printing Office
Washington 25, D. C.
Art Education:
Color Materials for Art Education in Schools, Recorded Voluntary Standard of the Trade, 10¢. Cat. No. C 13.20:130

United States Department of Commerce
National Bureau of Standards
Washington 25, D. C.
Glass and Glass Products

Westinghouse Electric Corporation
306 Fourth Avenue
P.O. Box 1017
Pittsburgh 30, Pa.
ABC of Flash Photography
Westinghouse Rapid Flash Calculator
Better Pictures Thru Better Lighting
Projection Lamp Guide

INDUSTRIAL AND GENERAL

Acoustical Materials Association
59 East 55th Street
New York 22, N. Y.
Sound Absorption Coefficients of Architectural Acoustical Materials (Bulletin XII, 1950)
Theory and Use of Architectural Acoustical Material, 25¢

Allis-Chalmers Mfg. Company
Advertising & Industrial
Press Department
Milwaukee 1, Wis.
A Hidden World
Directory of Products and Engineering Literature

American Bottlers of Carbonated Beverages
1128 Sixteenth Street, N.W.
Washington 6, D. C.
Food and Nutritional Values of Bottled Carbonated Beverages
The Manufacture of Bottled Carbonated Beverages
Sparkling Party Recipes
Health and Liquids
Fatigue versus Efficiency

American Can Company
100 Park Avenue
New York, N. Y.
High School Manual on Commercially Canned Foods
The Canned Food Handbook
Coffee Facts for Home Economists
A Word About Tin Cans
Appetizing Recipes from Canned Foods
Choice Recipes and Menus Using Canned Foods

American Concrete Institute
18263 West McNichols Road
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American Gas Association Publications
Reprints of Articles Covering Use of Gas and Electricity for Domestic Cooking and Heating Purposes, 25¢

American Iron and Steel Institute
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Building Code Modernization
Building Codes and Fire Safety
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Light Gage Steel Design Manual, $1
Steel Electrical Raceways, $1
Radiant Panel Heating with Steel Pipe

American Petroleum Institute
50 West 50th Street
New York 20, N. Y.
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Spindletop, A Texas Titan
Great Grow the Gases
Sunshine in the Rockies
Oklahoma, The State That Oil Built
Facts About Oil
Petroleum Marketing
Petroleum, Discovery and Production
Petroleum Transportation
Petroleum Products
Petroleum Newsnotes
Here Is No Fable, It's a Fact
The Early Years, A Story of the Beginnings of the Petroleum Industry

American Potash Institute, Inc.
1155 16th Street, N.W.
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Better Crops With Plant Food, 10¢

American Society of Mechanical Engineers
29 West 39th Street
New York 18, N. Y.
American Standard Plumbing Code (Minimum Requirements for plumbing), $2.50

American Standards Association, Inc.
70 East 45th Street
New York 17, N. Y.
Sizes of Clay Flue Linings (ASA Standard A62.4), 35¢
Sizes of Clay and Concrete Modular Masonry Units (ASA Standard A62.3), 50¢

American Sugar Refining Company, The
120 Wall Street
New York 5, N. Y.
The Story of Cane Sugar

American Viscose Corporation
350 Fifth Avenue
New York 1, N. Y.
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Rayon Glossary, No. 1004
Short Story of Rayon, No. 2008B
Handling of Rayon Cakes, No. 2118
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Avisco News
What's New in Rayon Fabrics
Avisco Rayonews
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Avisco Rayonews
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Unit No. TE 4–8 — Grades 4 to 8

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Program No. DEC — Charm School for Homes

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60 East 42nd Street
New York 17, N. Y.
Directions for Laying Galvanized Roofing
Facts About Galvanized Sheets
How to Make Galvanized Roofing Last Longer
Metallic Zinc Paint

Asphalt Roofing Industry Bureau
2 West 45th Street
New York 19, N. Y.
Choose Your Roof for Rain and Shine
Good Application Makes a Good Roof Better
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Manufacture, Selection and Applications of Asphalt Roofing and Siding Products, 35¢

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Accident Prevention Department
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New York 38, N. Y.
Your Guide to Safety as an Automobile Service Station Employee, No. I-3
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Food Store Safety Instructions, No. I-9
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Are You Safe in the Office, No. I-16
Women in the Factory, No. I-18
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Your Guide to Safety as A Restaurant Employee, No. I-20
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Your Guide to Safety as a Salesman Driver, No. I-24, 5¢
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Handbook of Industrial Safety Standards, No. I-102, $1.50 (Leather Cover)
Supervising Physically Impaired, No. I-107
Analysis of Job Requirements No. 2, No. I-108
Analysis of Job Requirements No. 3, No. I-109
A Safety Guide for Hotels, No. I-110, 10¢
Hotel Public Liability, Insurance and Accident Control, No. I-111
Selective Job Placement, No. I-117, $1
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Physically Impaired Can Be Insured Without Penalty, No. I-126
A Fire Prevention Guide for Hotels, No. I-127, 10¢
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Accident Prevention — Using Operations — Analysis Procedures, No. I-131, 6¢

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Tapping A Sapodilla Tree
Chicle Preparation
Package Wrapping Machines
Story of Beech-Nut Peanut Butter
The Story of Beech-Nut Strained Foods and Junior Foods
The Beech-Nut Idea — And the Story of Its Growth
Professor Finds Chewing Habit Aids Efficiency
The Story of Chewing Gum
My Visit to a Coffee Plantation in Colombia

Bethlehem Steel Company
Bethlehem, Pa.
Steel in the Making

Better Business Bureau
(Principal Cities in U.S.A.)
Facts You Should Know about Home Insulation, 5¢
Facts You Should Know about Buying or Building a Home, 5¢

California Redwood Association
405 Montgomery Street
San Francisco 4, Calif.
Data Sheets on Garden Structures
Exterior Finishes for Redwood (Data Sheet 4B3–1)
Interior Finishes (Data Sheet 4B4–1)
Interiors: Application and Finish (Data Sheet 3A7–7)
Redwood Vacation Homes
Yard Grades (Data Sheet 2B2–1)
Styling Your Home (Data Sheets)

Commonwealth of Pennsylvania
Department of Labor and Industry
Harrisburg, Pa.
Safe Practices Recommendations

Compressed Air and Gas Institute
1410 Terminal Tower
Cleveland 13, Ohio
Compressed Air Plays Big Part in Industry Progress
Compressed Air Power
Compressed Air Power in Construction

Copper and Brass Research Association
420 Lexington Avenue
New York 17, N. Y.
Brass Pipe (Handbook)
Copper Tube (Handbook for Plumbing and Heating)
Protection Against Termites with Copper Shields
Radiant Heating
How to Make Your Own Screens
Copper Batten Type Roofs
Copper Gutters and Leaders
Copper Roofs and Decks for Residences
Copper Valleys and Flashings for Residences
Safeguard Your Home with Copper, Brass and Bronze
The Life of Your Roof Hangs by a Nail

Corn Industries Research Foundation
3 East 45th Street
New York 17, N. Y.
Corn Facts and Figures
The Story of Corn and Its Products
Corn (quarterly bulletin)
Corn in Industry

Corning Glass Works
Corning, N. Y.
Famous Names in Chemical History, Frederick Banting
Famous Names in Chemical History, Joseph Priestley
Famous Names in Chemical History, Louis Pasteur
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Diamond Crystal Colonial Salt
Division General Foods Corporation
916 South Riverside Avenue
St. Clair, Mich.
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Tacoma 2, Wash.
Better Farm Buildings with Exterior Plywood
Douglas Fir Plywood, Architectural Catalog
Northern Farm House (Plan F4N)
Southern Farm House (Plan F2S)
Suggestions for Remodeling Attics, and Basements
One Thousand Uses for Douglas Fir Plywood
Paneling Suggestions for Douglas Fir Plywood
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Extra Strength That Saves You Money When You Build
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New York 17, N. Y.
Handbook of Farmstead Wiring Design, 40¢
Handbook of Residential Wiring Design (Single Family Dwellings), 25¢

Electrical Storage Battery Company, The
Philadelphia 32, Pa.
Facts and Fallacies About the Weather

Enameled Cast Iron Plumbing Fixtures Association
1709 M Street, N.W.
Washington 6, D. C.
How to Handle Enameled Cast Iron Plumbing Fixtures

Engineers' Council for Professional Development
29 West 39th Street
New York 18, N. Y.
Engineering as a Career, '42, 15¢
Reading List for Jr. Engineers, 10¢
A Professional Guide for Junior Engineers, $1
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The Electrical Engineers, 20¢
Most Desirable Personal Characteristics, 25¢
Code of Ethics of Interviewing Procedures (for employers), 15¢
Guidance Manual (for counselors of high school boys), 20¢

Factory Insurance Association
555 Asylum Street
Hartford, Conn.
Recommended Good Practice for Construction, Protection, and Operation of Saturating and Roofing Felt Plants

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Rust Building
Tacoma 2, Wash.
Facts You Should Know Before You Build a Garage

Firestone Tire & Rubber Company, The
Akron 17, Ohio
Teacher's Manual for "Rubber" Rubber

General Electric Company
1285 Boston Avenue
Bridgeport 2, Conn.
Frozen Foods, How to Prepare, Package, Freeze, Thaw, and Cook
New Hunches on Box Lunches
How to Enjoy Speed Cooking

Gypsum Association
Opera Building
20 North Wacker Drive
Chicago 6, Ill.
Fireproof Gypsum Latha
Fireproof Gypsum Sheathing
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Gypsum Partition Tile and Fireproofing
New Water-Repellant Gypsum Sheathing
The Fire Resistance of Gypsum Plaster
Sound Absorbing Gypsum Plaster
Design Data and Load Test on Reinforced Gypsum Concrete Floors and Roofs
Adhesion of Gypsum Plaster to Various Backings
Manual of Gypsum Lathing and Plastering
Standard Specifications for Gypsum Lathing and Plastering

Hercules Powder Company
Wilmington, Del.
Labors of War for Peace
Inside Hercules Land

Hershey Chocolate Corporation
Hershey, Pa.
The Story of Chocolate and Cocoa

Hoover Company, The
North Canton, Ohio
Carpets and Rugs
House Cleaning and Home Management Manual

Illinois Conservation Department
121 Capitol Building
Springfield, Ill.
Department Services
Fish Stocking Program
Game Code Digest
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Outdoor Movies
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Good Farming — Good Hunting
Multiflora Rose
Facts and Hints
Know Your Fish

Indiana Limestone Institute
Bedford, Ind.
Indiana Limestone

Inland Steel Company
38 South Dearborn Street
Chicago 3, Ill.
How Steel Is Made

Institute of Makers of Explosives
343 Lexington Avenue
New York 16, N. Y.
Blasting Caps Are Dangerous

Installation Board Institute
111 West Washington Street
Chicago 2, Ill.
Farm Building Insulation
Sound Insulation Values of Floors and Walls
What the Farmer Should Know About Insulating Board
What the Prospective Home Buyer Should Know About Insulating Board

Kewanee Boiler Corporation
Kewanee, Wis.
General Catalog 80, Kewanee Steel Boilers
Dry Steam, Bulletin 2114
Comparison of Water Tube Boilers Versus Fireboy Type Boilers, Bulletin 1784
Water Treatment for Heating Boilers, Bulletin 1705–3
Quality of Steam From Boilers Treated with Compound, Bulletin 2036–4.3
The Care of the Boiler When Not In Use, Bulletin 1705–2
Taking Care of the Boiler in Summer, Bulletin 1705
Combustion in Heating Boilers, Bulletin 2216
Boiler Efficiency & Flue Gas Loss for Fuel Oil, Bulletin 2095–1
The Significance of CO_2 in Oil Burner Operation, Bulletin 2095
Soot Removal Compounds, Bulletin 1599.1
No Advantage For Copper As Heating Surface in Boilers, Bulletin 1392

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Duluth, Minn.
Klearflax Linen Carpets
The Key to Lasting Beauty
Carpets and Rugs by Klearflax — Catalog, 10¢

Koebel Diamond Tool Company
9456 Grinnell Avenue
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How to Use Diamond Bits in Deep Drilling
General Outline of Diamond Coring

Kraft Foods Company
500 Peshtigo Court
Chicago 90, Ill.
The Romance of Cheese
Cheese Classics

Lead Industries Association
420 Lexington Avenue
New York 17, N. Y.
A Study of Paints for Enclosed Structural Members in Steel Housing Construction
Lead (published periodically)
Red Lead Technical Letter

Library Films, Inc.
25 West 45th Street
New York 19, N. Y.
Catalog of 16mm. Sound on Film

Maple Flooring Manufacturers Association
Suite 548, Pure Oil Building
35 East Wacker Drive
Chicago 1, Ill.
A Glimpse of an Interesting Modern Home
Finishing Northern Hard Maple Flooring the MFMA Way
Grading Rules for Northern Hard Maple, Beech, and Birch Flooring
Northern Hard Maple Flooring — Technical Brochure
"Thrifty Third" Grade — Northern Hard Maple Flooring

Metal Lath Manufacturers Association
Engineers Building
Cleveland 14, Ohio
Metal Lath News (Built-in fire protection, metal lath on wood) (Vol. 14, No. 2)
Metal Lath News (fire-resistant partitions) (Vol. 12, No. 2)
Metal Lath News (studless partitions) (Vol. 14, No. 1)
Summary of Metal Lath and Plaster Fire Resistive Rating
Metal Lath and Plaster for Beauty, Strength, Economy and Permanence
Metal Lath News (Hollow Partitions, including insulation tables) (Vol. 14, No. 3)
Metal Lath Specifications for Metal Lathing and Furring
Metal Lath News (plumbing) (Vol. 12, No. 2)
Metal Lath News (metal lath housing and anchorage for solid partitions) (Vol. 11, No. 2)
Metal Lath News (solid partitions) (Vol. 12, No. 2)
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Metal Lath News (electrical) (Vol. 12, No. 2)
Metal Lath News (lighting) (Vol. 14, No. 4)

Metropolitan Life Insurance Company
School Health Bureau
Health and Welfare Division
1 Madison Avenue
New York 10, N. Y.
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Absent From School Today
First Steps in Health Education
About Us and Our Friends
The School Administrator, Physician, and Nurse in the School Health Program
The School Health Program
Industrial Safety Education in Schools
Health Through the Ages
Health Heroes, Marie Curie
Health Heroes, Edward Livingston Trudeau
Health Heroes, Walter Reed
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Health Heroes, Robert Koch
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Minneapolis-Honeywell Regulator Company
Minneapolis 8, Minn.
Handbook for the Installer and Serviceman, No. SA 1399, 50¢ (Oil, Gas, and Stoker)
Air Conditioning Reference Manual, No. SA 1045, 50¢ (Pneumatic Controls)
Air Conditioning Reference Manual, No. SA 1044, 50¢ (Electric Controls)
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Electronic Moduflow for Panel Heating, No. SA 1499
Central Systems for Modern Schools, No. SA 1779

Morton Salt Company
120 South La Salle Street
Chicago 3, Ill.
A History of Salt

National Adequate Wiring Bureau
155 East 44th Street
New York 17, N. Y.
Check Your Wiring, 2¢
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National Specification for Residential Wiring, 25¢
The Private Life of Your Home, 15¢

National Association of Manufacturers
14 West 49th Street
New York 20, N. Y.
Startling Facts About Production and Progress
Dollars in Shirtsleeves
Who Profits from Profits?
All Together
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The Basic Principles Behind Good Employee Relations
Industry Believes
The Public Be Served
Facts About the NAM

National Association of Master Plumbers of the United States, Inc.
1105 K Street, N.W.
Washington 5, D. C.
Plumbing Code (1942), 50¢
Report on Plumbing Cross-Connections and Back Siphonage Research, $1
Report on Hydraulics and Pneumatics of the Plumbing Drainage System, 50¢
Water Supply Pipe for the Plumbing System, $1

National Board of Fire Underwriters
85 John Street, New York 38, N. Y.
1014 Merchants Ex., San Francisco 4, Calif.
Sixty Ways to Prevent Fire in Your Home
What Causes Destructive Fires
The Fire Safe Home
Fire Safety on the Farm
Stop Fires — Save Jobs
Safeguarding Industry
The Rehearsal
The Intruder
Fact Sheet
Speech Material
Radio Kits
Nature's Artillery (lightning protection)
National Electrical Code as Recommended by the National Fire Protection Association (up to 10 copies)
Building Code Standards of the NBFU for the Installation of Heat Producing Appliances, Heating, Ventilating, Air Conditioning, Blower and Exhaust Systems

National Carbon Company
515 Wilson Building
Dallas 1, Tex.
National Acheson

National Child Labor Committee
419 Fourth Avenue
New York 16, N. Y.
Exhibit Book Containing Samples of Current National Child Labor Committee Publications, Loaned for Return Postage

National Cottonseed Products Association, Inc.
618 Wilson Building
Dallas 1, Tex.
How Cottonseed Serves You

National Fire Protection Association
60 Batterymarch Street
Boston 10, Mass.
The Story of the National Fire Protection Association
Build a Fire Safe Home
Keep Your Home from Burning
List of Publications — Story of the N.F.P.A.
Protection of Life and Property Against Lightning
The Protection of Wall Openings
Make Your Chimney Safe
Spark Arrestors for Chimneys

National Lime Association
925 15th Street, N.W.
Washington 2, D. C.
Lime on Lawns and Flower Gardens (Bulletin 180–A)
Specifications for Lime and Its Uses in Plastering, Stucco, Unit Masonry, and Concrete
Whitewash and Cold-Water Paints (Bulletin 304–F)
Masonry Mortar
Lime Hints for the Home

National Lumber Manufacturers Association
1319 18th Street, N.W.
Washington 6, D. C.
House-Framing Details, 10¢
Manual on Sheathing for Buildings
Maximum Spans for Joists and Rafters, 10¢
Plank and Beam Floor and Roof System
Stud Walls — Safe Axial Loads, 5¢
Wood Walls, 10¢
Wood Wall-Sheathing — Strength and Insulation for the Skeleton of Your House
Let's Build a Wood Fence
Exposing the Termite
Lumber Grade-Use Guide, $2.50
Lumber Literature — a Bibliography
Wood Structural Design Data and Supplements, $2.25

National Mineral Wool Association
2906 RKO Building, Rockefeller Center
New York 20, N. Y.
Facts You Should Know About Home Insulation
Insulation and Your Home
Recommended Practices for the Installation of Mineral Wool Batts and Blankets

National Oak Flooring Manufacturers Association
814 Sterick Building
Memphis 3, Tenn.
Home Owner's Guide
Oak Floors for Long-Time Beauty
Planning and Decorating the Most Important Side of a Room
Specification Manual for Certified Oak Floors

National Paint, Varnish, and Lacquer Association, Inc.
1500 Rhode Island Avenue, N.W.
Washington 5, D. C.
Construction Defects (Circular 723), 15¢
Roof Coating Manual (Circular 736), 12¢

National Safety Council
425 North Michigan Avenue
Chicago 11, Ill.
Accident Facts

National Terrazzo and Mosaic Association, Inc.
711 14th Street, N.W.
Washington 5, D. C.
Divider Strip Location and Data Bulletin
Outdoor Terrazzo Bulletin
Technical Data and Specifications for Terrazzo and Mosaic Work
Terrazzo Maintenance Bulletin
Terrazzo and Radiant Heating
Terrazzo Streamlined Bathrooms

National Warm-Air Heating and Air-Conditioning Association
145 Public Square
Cleveland 14, Ohio
A Yardstick for Classifying Warm Air Winter Conditioning Systems (Manual 8), 60¢
Code and Manual for Ceiling Panel Systems (Manual 7–A), 60¢
Code and Manual for Changing Forced Air Systems to Continuous Air Circulation (Manual 6), 60¢
Code and Manual for Gravity Systems (Manual 5), 60¢
Code and Manual for Winter Air Conditioning Systems (Manual 7), 60¢
How to Check Frame House Construction (Manual 2), 60¢
How to figure Heat Losses (Manual 3), 60¢
How to Make a Comfort Survey — How to Make Floor Plans (Manual 1), 60¢

Naumkeag Steam Cotton Company
Salem, Mass.
The Pequot Story

New Jersey Bureau of Engineering and Safety
Department of Labor and Industry
Trenton, N. J.
Exhaust Systems, 10¢
Safety Education, 5¢
Safety Subjects, 5¢
Are You Planning to Get a Job
Dust Control in Foundries
Industrial Dermatoses
Occupational Hazards & Diagnostic Signs, 15¢
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Pacific Coast Borax Company
510 West 6th Street
Los Angeles 14, Calif.
From Death Valley we Get Borax
Oh, Dear, What Can the Matter Be?
First Aid for Housekeepers
Reprint from the 1950 Book of Knowledge Annual

(Continued on page 18A)

PROBLEMS AND PROJECTS

TEN AND ONE-HALF FOOT PLYWOOD SKIFF

CLAUDE HORST
University of Washington
Seattle, Wash.

This 10 ft. 6-in. plywood skiff is very sturdy, easy to build, light in weight and will carry three adults with ease. The author has used this type of project for a number of years in his school shop, and has found it most satisfactory. It makes an excellent project for junior or senior high school students. The whole project is also designed to conserve shop space since the structure may at any time during the construction period be moved about or set on end against the wall out of the way. The project has many desirable characteristics, the most important being that most boys would like to have it and therefore are willing to try to meet the necessary requirements. The project offers excellent learning situations, some of which are listed below:

1. It requires learning how to read the drawings in order to construct the various parts according to the dimensions given.

2. It is necessary to learn how to make a complete bill of material, figure the board feet of lumber needed, the number and kind of fastenings required, and to make an estimate of the cost of the boat before being allowed to start.

3. A certain construction sequence must be followed which requires considerable planning.

4. It requires a goodly number of hand tools which the student must learn to use with skill.

5. It may be built by one boy or it may be handled as a group project.

6. It is a safe and useful project and yet is not too expensive.

7. It is a project that would be well received by most parents.

8. The nature of the project is such that any part of the construction which is not up to standard may easily be replaced with better workmanship.

9. The student learns something about boat construction during the building process, and something about boat handling and seamanship through his experiences with it in actual use in the water.

The sequence outlined below need not be followed too closely in making various parts, but the sequence given in assembling the various parts on the building horse should be rather closely followed.

Bill of Material

All material must be of the best quality boat material, free of knots, pitch seams, or any other defects. All long pieces must have straight, fine, even grain. Material for the frames should be vertical grain, air-dried stock. Material for the battens should be quarter sawn, air-dried stock.

Material for the Horse

1 only	1¾″ x 5½″ x 3′
2 only	¾″ x 9½″ x 11′
1 only	¾″ x 5½″ x 8′
1 only	¾″ x 5½″ x 14′

Material for the Skiff

Item	*Quantity Required*	*Size*
Stem	1 only	1½″ x 5¼″ x 24″ W.O.
Frames		
Top sides	1 only	¾″ x 11½″ x 36″
Transom sides	1 only	¾″ x 6″ x 24″
Bottom pieces	1 only	¾″ x 3¾″ x 24′
Sheer battens	2 only	½″ x 1½″ x 12′
Chine battens	2 only	½″ x 1½″ x 12′
Seat clamp (riser)	2 only	½″ x 1½″ x 12′
Breast hook	1 only	1″ x 6″ x 14″ W.O.
Transom knees	1 only	¾″ x 6″ x 14″ W.O.
Outer stem	1 only	1″ x 2⅜″ x 20″ W.O.
Keel	1 only	⅝″ x 2″ x 11′ W.O.
Bow and stem knees	1 only	1″ x 5″ x 20″ W.O.
Rub rail	2 only	⅝″ x 1½″ x 12′ W.O.
Oarlock blocks	2 only	1¼″ x 2½″ x 6″ W.O.
Floor sections	6 only	½″ x 4″ x 8′
Seat braces	1 only	½″ x 2″ x 3′

Waterproof Plywood

1 only	¼″ x 2′	x 4′ 4″	(Framing panel)
1 only	½″ x 1′ 4″	x 3′ 6″	(Transom)
1 only	½″ x 11″	x 4′ 0″	(Center seat)
1 only	½″ x 18″	x 2′ 6″	(Front seat)
1 only	½″ x 18″	x 4′ 0″	(Aft seat)
1 only	¼″ x 3′	x 12′ 0″	(Two sides)
1 only	¼″ x 4′	x 12′ 0″	(Bottom)

Metal

1 only	Stem band	⅛″ x ½″ x 24″ (gal.)

Fastenings — Galvanized Screws

1 gr.	1¼″	No. 8 f.h. screws
60 only	2″	No. 10 f.h. screws
60 only	1⅜″	No. 8 f.h. screws
2½ gr.	⅝″	No. 7 f.h. screws
1 gr.	1¼″	No. 7 f.h. screws
2 gr.	⅞″	No. 7 f.h. screws

Galvanized Bolts

2 only	¼″ x 4″ carriage	(Stem to horse)
8 only	⅜″ x (length to suit)	(Bow and stem knee)
4 only	¼″ x 3″ carriage, gal.	(Oarlock blocks)

Nails

½ lb.	6*d*. finish (gal.)
½ lb.	6*d*. box
½ lb.	8*d*. box
½ lb.	10*d*. box

Equipment Required

1 only	Pair of 7 ft. oars
1 only	Pair of oarlocks
1 only	Pair of oarlock sockets
1 only	Bow line (painter) 15 ft. of ½-in. rope

1. *Material for the Boat*

If the material given in the Bill of Material is not available, any good local boat material may be substituted.

2. *Material for the Horse*

The horse should be accurately made of S4S material, although the quality need not be good. Lay out and shape the two longitudinal pieces according to the dimensions shown in Figure 3. Mark the locations of the frame supports. Cut the frame supports and the bottom stiffener piece of 1 by 6-in. stock. The stiffener piece must be perfectly straight. Cut away several inches at the front end of the side pieces as shown. This makes it easier to apply clamps when attaching chine battens later. Assemble the structure using 10*d*. nails. The stem and transom pieces are made of 2 by 6 in. stock. The transom support is about the same length as the frame supports. Attach carefully according to the dimensions given in Figure 3. Shape the stem support piece according to Section D-D, Figure 3. The 3-in. end may be extended upward some 8 in. or 12 in. as desired. Attach it accurately according to the dimension given in Figure 3. Draw a center line on all upright pieces including the stem and transom supports as shown in Figure 5. The horse is now ready for use.

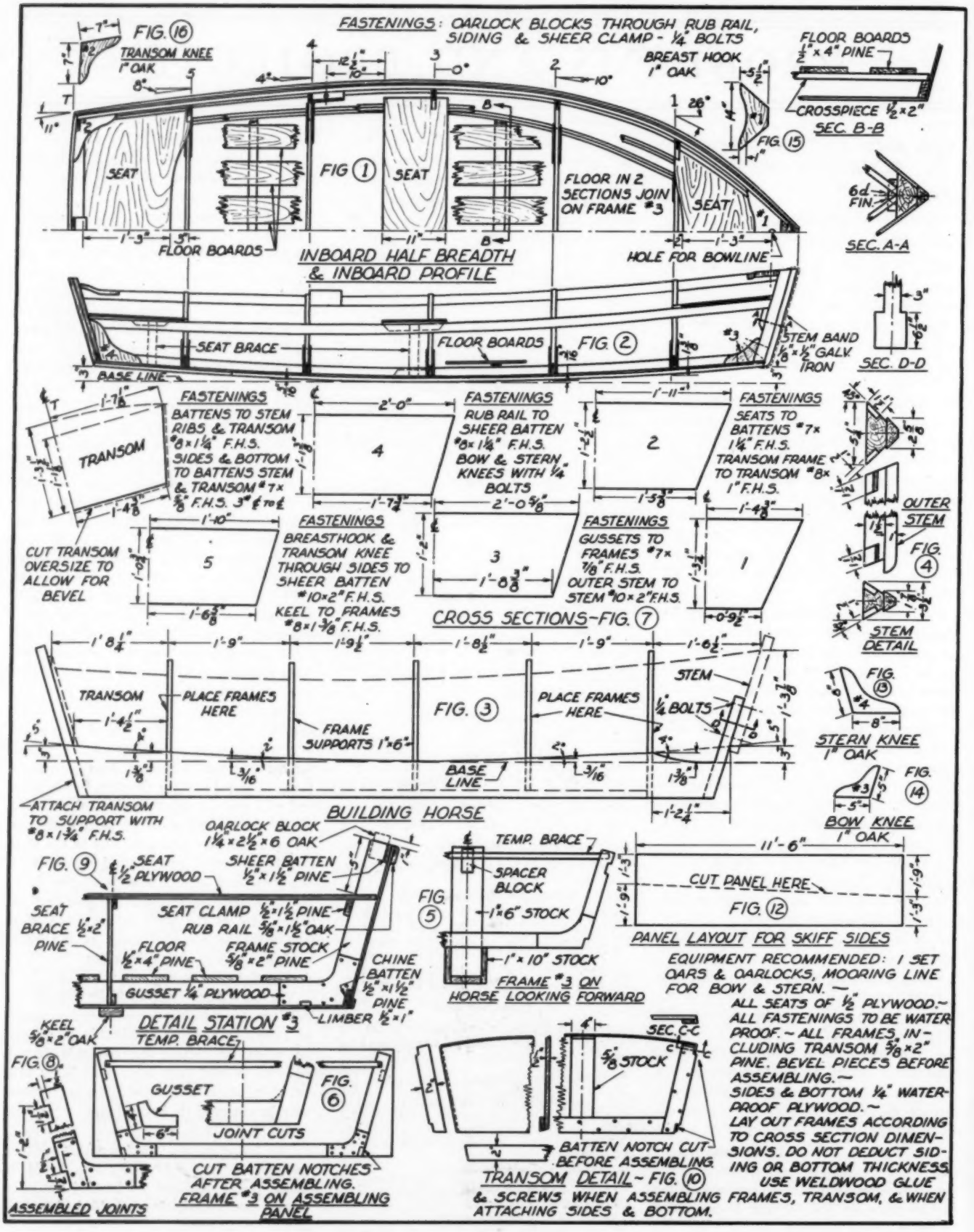
3. *The Stem*

Make the stem, Figure 4, of kiln dried W. oak. A piece 4 or 5 in. longer than needed for the stem should be used. This extra stock makes it easy to attach the stem to the horse and also permits some bracing in case that should be necessary when putting on the siding. Shape the stem according to the stem detail drawing, Figure 4, and attach it to the front end of the horse with two ¼-in. bolts, as shown in Figure 3. Be sure that the lower edge of the chine batten notch is in line with the extended curve of the horse or 3 in. above the horse base line.

4. *The Frames*

The frames are made of ⅝ by 2-in. stock. All frames except No. 3 are beveled as shown in Figures 1 and 3. Considerable stock may be saved by cutting the top side frames properly beveled from a piece of ¾ by 11½ by 36-in. stock. The top-side transom frame may be cut properly beveled from a piece of ¾ by 5½ by 18-in. stock.

The frame bottom cross members may be cut from a piece of ¾ in. by 3 in. by 24 ft. These pieces need not be beveled until the frames are completely assembled since the angles are all small.


FASTENINGS: OARLOCK BLOCKS THROUGH RUB RAIL, SIDING & SHEER CLAMP - ¼" BOLTS
FIG. 16
TRANSOM KNEE 1" OAK
BREAST HOOK 1" OAK
FIG. 15
FLOOR BOARDS ½" x 4" PINE
CROSSPIECE ½ x 2"
SEC. B-B
SEAT
FIG. 1
SEAT
FLOOR IN 2 SECTIONS JOIN ON FRAME #3
SEAT
6d FIN.
SEC. A-A
FLOOR BOARDS
INBOARD HALF BREADTH & INBOARD PROFILE
HOLE FOR BOWLINE
SEAT BRACE
FLOOR BOARDS
FIG. 2
STEM BAND ⅛" x ½" GALV. IRON
SEC. D-D
BASE LINE
TRANSOM
FASTENINGS
BATTENS TO STEM RIBS & TRANSOM #8 x 1¼" F.H.S. SIDES & BOTTOM TO BATTENS STEM & TRANSOM #7 x ⅝" F.H.S. 3" c to c
4
FASTENINGS
RUB RAIL TO SHEER BATTEN #8 x 1½" F.H.S. BOW & STERN KNEES WITH ¼" BOLTS
2
FASTENINGS
SEATS TO BATTENS #7 x 1¼" F.H.S. TRANSOM FRAME TO TRANSOM #8 x 1" F.H.S.
OUTER STEM
FIG. 4
CUT TRANSOM OVERSIZE TO ALLOW FOR BEVEL
5
FASTENINGS
BREASTHOOK & TRANSOM KNEE THROUGH SIDES TO SHEER BATTEN #10 x 2" F.H.S. KEEL TO FRAMES #8 x 1⅜" F.H.S.
3
FASTENINGS
GUSSETS TO FRAMES #7 x ⅞" F.H.S. OUTER STEM TO STEM #10 x 2" F.H.S.
1
CROSS SECTIONS - FIG. 7
STEM DETAIL
TRANSOM
PLACE FRAMES HERE
FRAME SUPPORTS 1" x 6"
FIG. 3
PLACE FRAMES HERE
STEM
¼" BOLTS
FIG. 13
STERN KNEE 1" OAK
BASE LINE
ATTACH TRANSOM TO SUPPORT WITH #8 x 1¾" F.H.S.
BUILDING HORSE
FIG. 14
BOW KNEE 1" OAK
FIG. 9
OARLOCK BLOCK 1¼" x 2½" x 6 OAK
SEAT ½" PLYWOOD
SHEER BATTEN ½" x 1½" PINE
SEAT BRACE ½" x 2" PINE
SEAT CLAMP ½" x 1½" PINE
RUB RAIL ⅜" x 1½" OAK
FLOOR ½" x 4" PINE
FRAME STOCK ⅜" x 2" PINE
CHINE BATTEN ½" x 1½" PINE
GUSSET ¼" PLYWOOD
LIMBER ½" x 1"
KEEL ⅝" x 2" OAK
DETAIL STATION #3
TEMP. BRACE
FIG. 8
GUSSET
FIG. 6
6"
JOINT CUTS
CUT BATTEN NOTCHES AFTER ASSEMBLING.
FRAME #3 ON ASSEMBLING PANEL
ASSEMBLED JOINTS
FIG. 5
TEMP. BRACE
SPACER BLOCK
1" x 6" STOCK
1" x 10" STOCK
FRAME #3 ON HORSE LOOKING FORWARD
11'-6"
CUT PANEL HERE
FIG. 12
PANEL LAYOUT FOR SKIFF SIDES
SEC. C-C
⅝" STOCK
BATTEN NOTCH CUT BEFORE ASSEMBLING.
TRANSOM DETAIL - FIG. 10
& SCREWS WHEN ASSEMBLING ATTACHING SIDES & BOTTOM.
EQUIPMENT RECOMMENDED: 1 SET OARS & OARLOCKS, MOORING LINE FOR BOW & STERN. —
ALL SEATS OF ½" PLYWOOD. — ALL FASTENINGS TO BE WATER PROOF. — ALL FRAMES, INCLUDING TRANSOM ⅜ x 2" PINE. BEVEL PIECES BEFORE ASSEMBLING. — SIDES & BOTTOM ¼" WATER PROOF PLYWOOD. — LAY OUT FRAMES ACCORDING TO CROSS SECTION DIMENSIONS. DO NOT DEDUCT SIDING OR BOTTOM THICKNESS. USE WELDWOOD GLUE FRAMES, TRANSOM, & WHEN

A piece of ¼ by 24 by 52-in. plywood makes an excellent framing panel in Figure 6. It will be less confusing to use both sides of the panel for laying out the frames. Three frames may be laid out on one side and the other two on the opposite side. The frames should be laid out according to the dimensions given in the cross sections shown in Figure 7. After cutting the proper angles to the various frame pieces, arrange them on the panel, and tack them temporarily in place. Cut the gussets of ¼-in. plywood as shown and attach them to the frames with Weldwood glue, or equivalent, and ¾-in. f.h. screws. Gussets are made of surplus stock left when cutting the side pieces. Hold the gussets in place with ¾-in. gal. brads. Attach a temporary brace across the top with 6*d*. nails. The brace on frames 1 and 2 should be on the forward side. On frames 3-4-5 the brace should be on the aft side. Do not disturb for 24 hours, then put the gussets on the other side. Next check the bevels for the top-side frame and bevel the bottom. Then cut the batten notches. See Figure 8 and cut the limber hole as shown in Figure 9. Repeat the above procedure for the other frames. Locate the center line on each top brace and the bottom frame member (Fig. 6). The frames are now ready to be placed at their proper position on the horse. Be sure to put them on the proper side of the horse frame supports, line the center line of the frame with the center line of the supports and fasten them in place with 8*d*. nails. Do not drive the nails all the way in so that they may be pulled out later. A small spacer block, Figure 5, should be placed between the frame brace and the horse frame supports. This will permit the frame to stand perpendicular on the horse. Horizontal bracing keeps frames from shifting. See Figure 11.

5. *The Transom*

The transom is laid out on the transom stock according to the transom dimensions. Cut it oversize and trim to the proper bevel later. Notch the top-side transom frame pieces for the battens before attaching them to the transom with glue and No. 8 by 1-in. f.h. screws (Fig. 10). Attach the center piece in the same manner, draw the center line and place it on the horse. Attach it to the transom support with No. 8 by 1¾-in. f.h. screws, or it may be held in position with two clamps, one at the top and the other at the bottom.

6. *Sheer Battens*

The sheer battens are made of ½ in. by 1½ in. by 12-ft. pine stock. Cut the front end to fit the angle of the stem. Drill and countersink the front ends for No. 8 by 1¼-in. f.h. screws and fasten the front end to the stem, clamping them in place one at a time, putting clamps at each frame but none at the transom. As soon as both battens are clamped in place, loosen them to relieve the strain in case the bending of the first batten might have distorted the structure a bit. Check the structure for accuracy, shift where necessary, and again tighten all clamps. Then put in the other screws. Hold the aft ends of the battens even with the top of the transom and mark them for the batten notch. This cut is tricky so cut it a bit oversize the first time for a check and then make the final cut. Drill the anchor holes for the No. 8 by 1¼ in. f.h. screws through the battens and into the frames. Then drill and countersink the batten pilot holes for No. 8 f.h. screws and attach.

7. *Chine Battens*

Bevel the bottom of the chine battens and repeat the procedure just discussed for attaching the sheer battens. Figure 11 shows the frame structure ready for the siding.

8. *Siding*

Lay out the two side pieces on ¼-in. exterior plywood, Figure 12. Cut out oversize and clamp one side piece in position to the frame structure. Mark where the sheer and chine battens contact the side piece, trim the piece carefully leaving it about ¼-in. oversize all around. Cut the second piece exactly like the first, using it for a pattern. Apply glue to all contact surfaces and attach the side pieces in position with clamps. Loosen the clamps, if necessary, to shift either of the side pieces. Retighten the clamps and put in the screws 3 in. c. to. c. The clamps may be removed as the screws are driven.

9. *Seat Risers or Seat Clamps*

The top of the seat risers should be beveled as shown in Figure 9. Locate the position of the riser at the stem, frame No. 3, and the transom frame. Shape a small support block as shown at A-A, Figure 2, and Sec. A-A. Attach it with 6*d*. finish nails and glue. Use a very thin batten about ¼ in. by ½ in. by about 11 ft., cutting it to fit the exact length of the seat clamp. From this batten mark the exact length of the top or bottom edge of the seat battens and mark the bevels for both ends. Cut somewhat long for the first try, then make the final cut. Attach the battens with No. 8 by 1¼-in. f.h. screws at all frames including the transom.

At this time plane off the siding at the bow even with the front face of the stem.

10. *Remove the Structure From the Horse*

Remove all fastenings which hold the structure to the horse and lift it from the horse. Place it upside down on some sawhorses or boxes. With a plane clean off the surplus from the siding so the sides will be even with the chine battens and bottom frames. Cut off the bottom of the stem even with the sides and battens. Check the bottom of the whole structure, including the bottom of the transom, and see that it is even all around for the bottom.

11. *The Bottom*

Place the bottom material on the structure and mark all around. Cut about ⅛ in. outside of the line. On the bottom piece lay out the surface which will contact the structure, including the stem, transom frame, bottom frames, siding and chine battens. Spread glue on all contact surfaces and place the bottom in position on the structure, tack in position and then fasten it in place with No. 7 by 1 in. f.h. screws, 3 in. c. to. c. Trim off the bottom piece all around and complete planing the siding at the stem so the stem face will be ready to attach to the outer stem.

12. *The Keel*

The keel is an oak strip ⅝ in. by 2 in. by

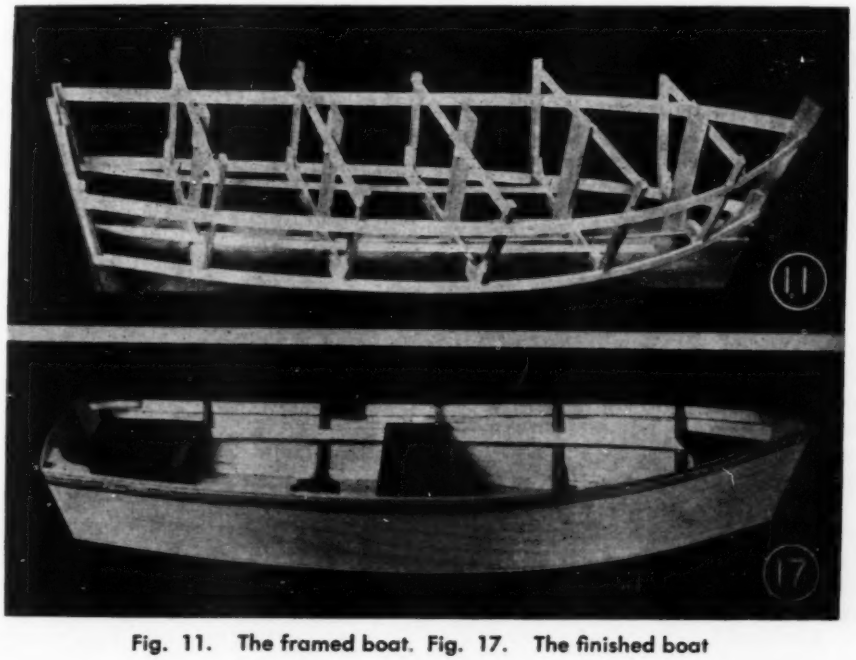


Fig. 11. The framed boat. Fig. 17. The finished boat

11 ft. attached with No. 8 by 1¼-in. f.h. screws, two at each frame, bow and transom. See Figures 2 and 9.

13. *Bow and Stern Knees*

Turn the boat right side up. Shape the bow and stern knees of 1-in. oak stock and fit them carefully, Figures 13 and 14. Attach each with 4 ¼-in. carriage bolts — length to suit. Countersink the heads flush with the bottom of keel inner stem and transom.

14. *The Outer Stem*

Shape the outer stem of W. oak (Fig. 4 and Sec. A-A, Fig. 4). Attach it to the boat with waterproof glue and 4 No. 10 by 2¼-in. f.h. screws. Fair up the bottom of the stem and keel. Check the top of the stem, fair it with the siding if necessary. Trim off the top even with the sheer. The boat is now ready for the rub rail.

15. *Seats*

The seats are made of ½-in. plywood stock. Cardboard patterns carefully fitted should be used to mark the seats accurately. Allow for bevel and cut out. Finish the edges carefully and paint or varnish the underside and edges with several coats before permanently attaching them to the seat risers with No. 7 by 1¼-in. f.h. screws. If the temporary cross braces interfere with the seat installation, they may be removed.

16. *Trimming the Sheer*

Cut off all frame tops and trim off the plywood siding even with the sheer battens. Figure 9.

17. *Breast Hook*

The breast hook, Figure 15, may be made of 1-in. oak or pine, as desired. Cut out and fit carefully. The aft edge should extend about ¼ in. above the sheer batten so it may be rounded off with the center higher after it has been permanently attached. Attach it with No. 8 by 2-in. f.h. screws. Bore a hole for the painter or bow line.

18. *Transom Knees*

Transom knees, Figure 16, may also be made of 1-in. oak or pine. Cut out and fit carefully. Attach them with No. 8 by 2-in. f.h. screws.

19. *The Rub Rail*

The rub rails should be made of hardwood ⅝ by 1½-in. stock. White oak is good as it is hard and flexible. Round off the outside edges, Figure 9, and attach them to the boat with No. 8 by 1¼-in. f.h. screws, 6 in. c. to c., alternately placed near the top and bottom edge. Cut off the ends even with the stem and transom and round them as shown in Figure 1.

20. *The Oarlock Block*

The oarlock block should be made of hardwood such as white oak. Shape as shown in Figures 1, 2, and 9. Bore a through hole for the oarlock socket and attach each block to the boat with 2 ¼ by 5-in. carriage bolts.

21. *Seat Braces*

Attach a small perpendicular brace under the center and aft seats to prevent excessive flexing, as shown in Figures 2 and 9. These braces are held in position by fastening them to lugs which are attached to the underside of the seats and the bottom of the boat. They are attached with No. 7 f.h. screws, lengths to suit.

22. *Floor Boards*

The floor should be made in two removable sections which meet on frame No. 3 under the center seat. Slats ½ by 4 in. with the length cut to suit, are spaced as desired and fastened to two cross members to each section with No. 7 by 1 in. f.h. screws. This completes the floor. See Figure 1, Section B-B, and Figure 2.

23. *Stem Band*

The stem band may be a piece of brass or galvanized iron ⅛ by ½ by 24 in. Drill and countersink holes for 6 No. 7 by ¾-in. f.h. screws. This band should be attached after all finishing coats have been put on.

24. *Finish*

Check the hull carefully for any unfinished work. All edges should be well sanded to make a smooth, even surface. The boat may be finished natural or it may be given some desired color. In either case put on a seal coat, after which apply coats of marine varnish. Attach the stem band and the boat is ready for use.

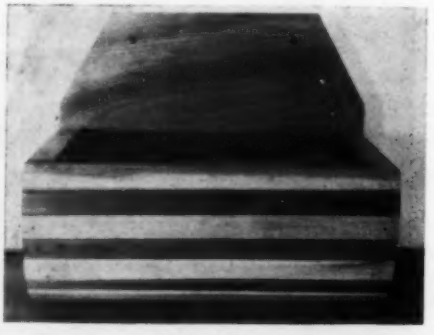
TWO WOOD FLOWER BASKETS

DICK HUTCHINSON
San Gabriel, Calif.

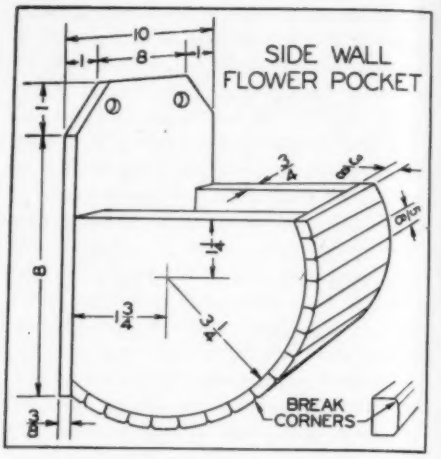
The two flower baskets will be appreciated by anyone who likes flowers. One, or both pieces can be made in a very short time as there is a minimum of hand work.

If carefully constructed they are suitable for hanging inside, or they may be just nailed together for hanging outside.

In going over a pile of gumwood we find extreme contrast in nearly every board. The body wood is white, while the heart is red,

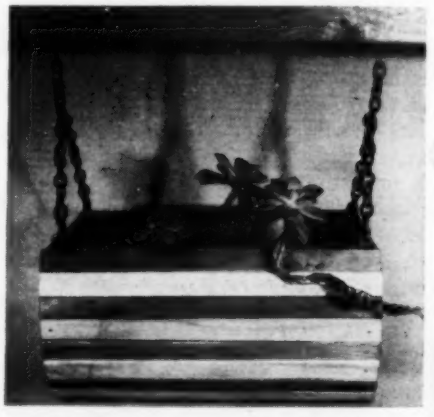


The assembled side wall flower holder. Note black asphaltum inside finish



or dark brown in color. This was taken into consideration in selecting the ⅜-in. gum used to produce the interesting striped effect so necessary to make a thing of this kind attractive.

The end pieces for the two baskets shown are cut from ¾-in. white pine. They are cut out on the band saw, and are sanded smooth. The back panel for the side wall basket is of ⅜-in. red gumwood.



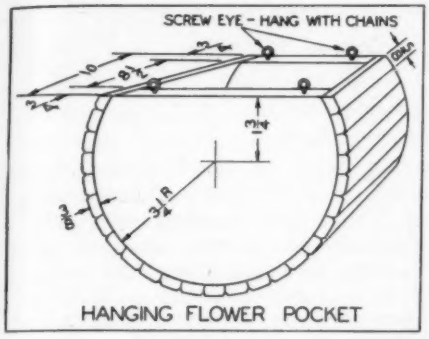
The hanging flower basket. Note contrasting woods

Cut the necessary strips for the slats for one or both of the baskets. Sand smooth and break the corners. True up the edges and assemble with resinous glue and brads. Alternate the red and white slats as illustrated.

Give all outside, or exposed surfaces two coats of white shellac, and to waterproof, give the inside of each basket two coats of black asphaltum varnish.

Set four screw eyes in the ends of the hanging basket and hang as desired, with brass or copper chain. Fill with rich soil and plant ivy or anything else in it.

The chain used, and shown in the photograph, was handmade by winding heavy copper wire around an oval rod, then cutting the links



apart and assembling into this very attractive chain.

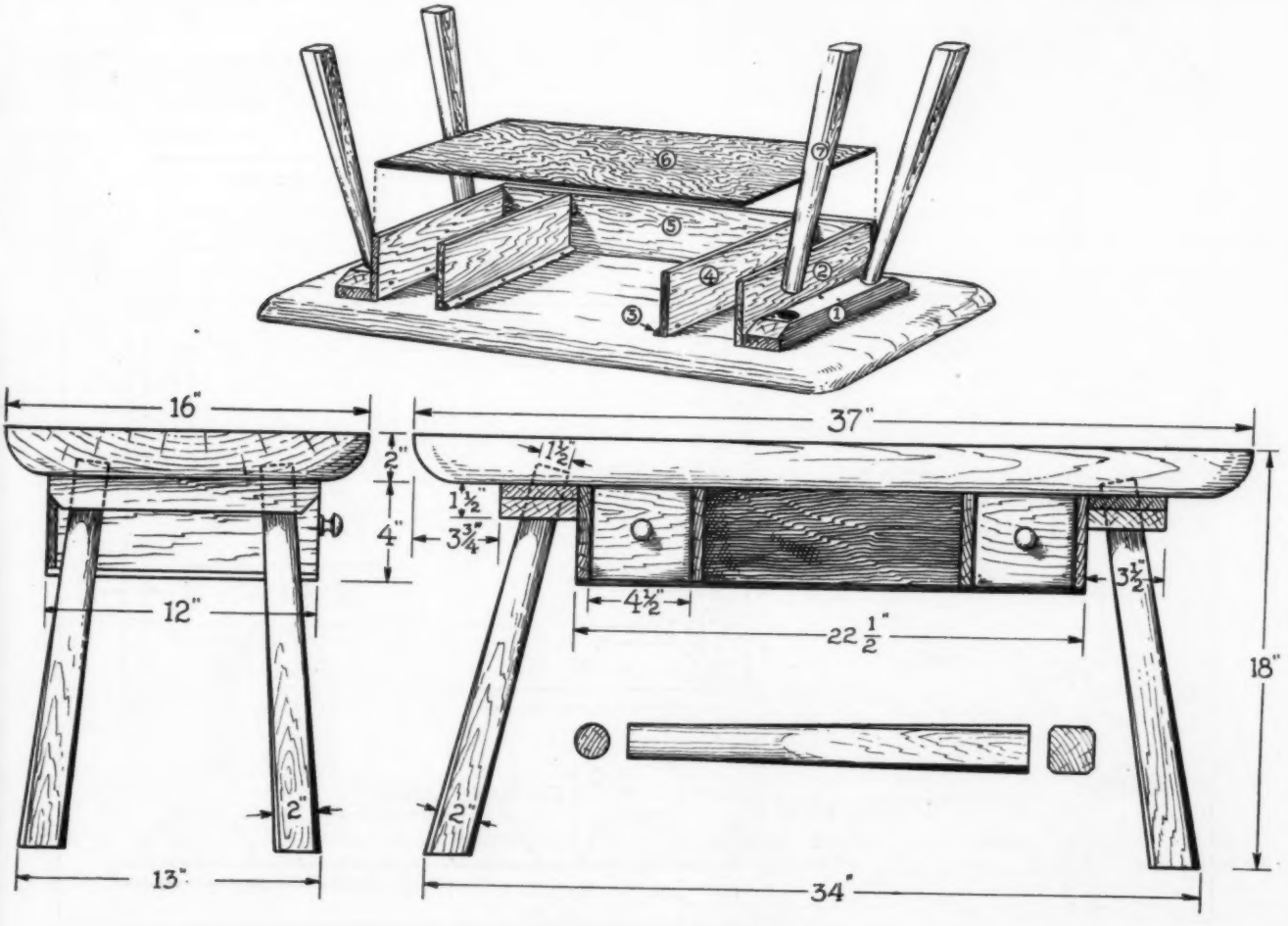
TV SNACK TABLE

BEN HUNT

Hales Corners, Wis.

The delicate mahogany or walnut cocktail and coffee tables most of us have in our homes do not seem to adapt themselves to the everyday wear and tear demanded of a TV snack table. They have no place for

Snack table



Details of snack table

pipes and tobacco, no place for napkins or the daily or weekly schedule, and the pad and pencil.

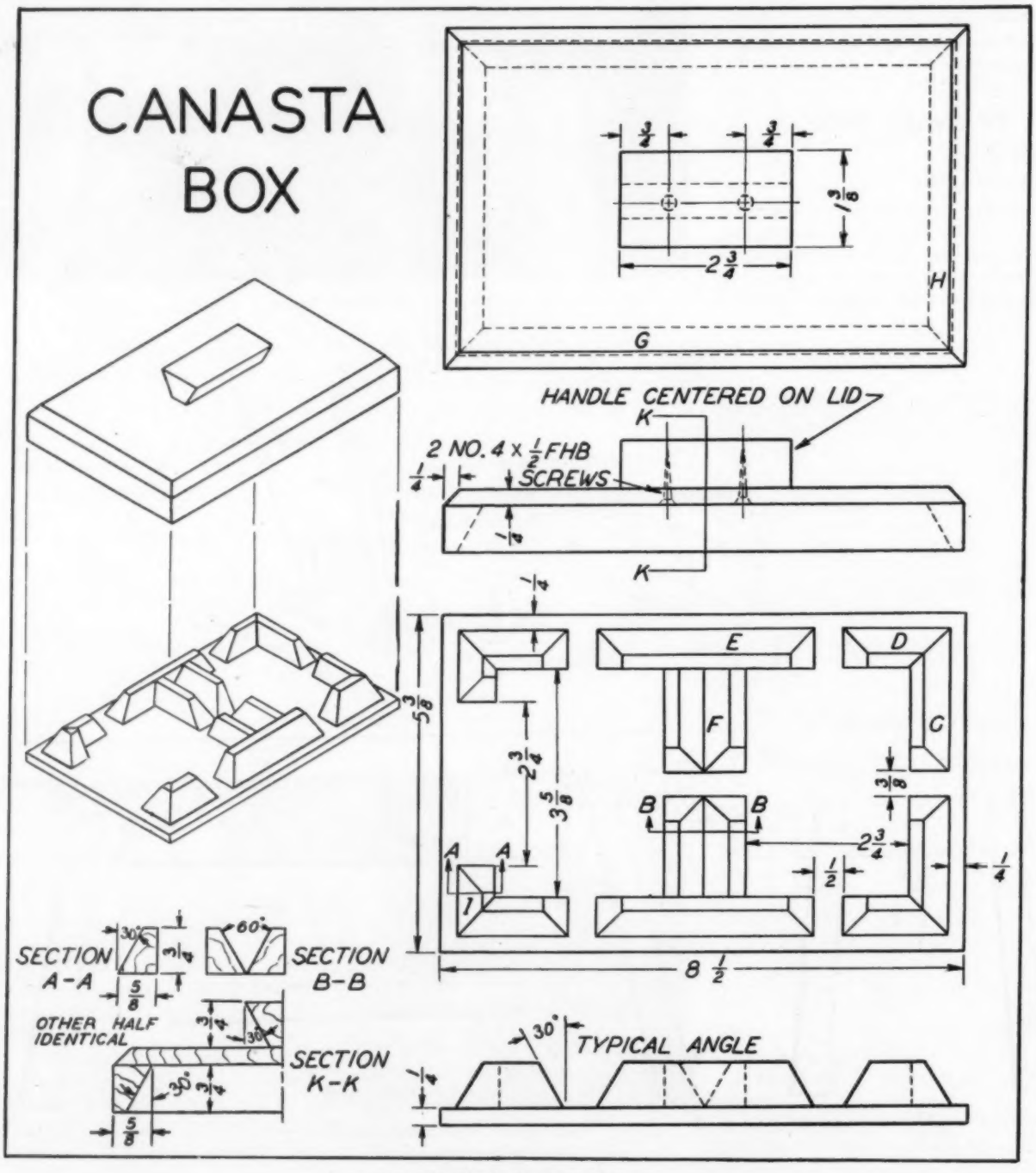
All these things have been incorporated in the table shown in this article, which was made to fit around an old pine plank that had seemingly served its purpose in another capacity. A one-inch top would serve equally well and while the table shown was made entirely of pine, any available wood would do. Discounting the little dado and grooving work on the two drawers, the entire bench can be made with hand tools if necessary.

After a good sanding and breaking down of the edges and corners to give it a used look, the entire table was given a coat of light oak stain, a coat of shellac, cut 50 per cent with alcohol, a coat of outside spar varnish, and then a coat of flat varnish. Between coats it was rubbed down with fine steel wool. Lastly, the top was given several coats of a good furniture wax.

CANASTA BOX

GEORGE N. DUERKSEN
Teacher of Drafting
East High School
Wichita, Kans.

The canasta box that is described in this article is almost wholly a student design. Quite often the woodworking instructor has a beautifully grained piece of wood tucked away for some small project. This box takes



Details of the canasta box

care of that favorite piece as it can be used for the lid. Aside from being a project that is very useful, it can be made cheaply. Scraps can be utilized and it involves many difficult cuts and matching of joints that test the woodworker's skill. The handle on the lid may be omitted which seems to add rather than detract from the appearance as a whole. A valuable addition would be to attach four ¼-in. diameter rubber domes of silence under the base. This prevents scarring the table top and will insure keeping the base more rigidly in its place. All parts are glued and bradded to the base as are the parts that form the rim of the lid. The chamfer of the lid is definitely the final cut. The groove at F serves as a pencil receptacle.

By examining the accompanying picture one can best see the position of the two stacks of cards especially the discard pile. It will be noted how the widest gap accommodates the freeze cards.

Articles such as this one are the outgrowth of an assignment in project design. A similar result is obtained by calling for a design of a useful plastic or metal article for the home. Naturally the instructor should introduce the endeavor with suggestions and possibilities thereby guiding student thought.

PIPE RACK AND TOBACCO HOLDER

ROLAND A. HOEHN, JR.
East St. Louis, Ill.

For father, uncle, or older brother, or any fellow interested in pipes and dogs, this project makes a worth-while gift. The dog's name above the door may be changed as well as the materials used in the project. This project is quite colorful as well as being useful, and its production involves many of the common tool operations.

Suggested Plan of Procedure and Materials

House

1. Select a suitable piece of poplar ½ by 4 by 9 in., and cut out the front and back of the house as per drawing. Cut the sides from two pieces, each being ½ by 3⅛ by 3½ in.

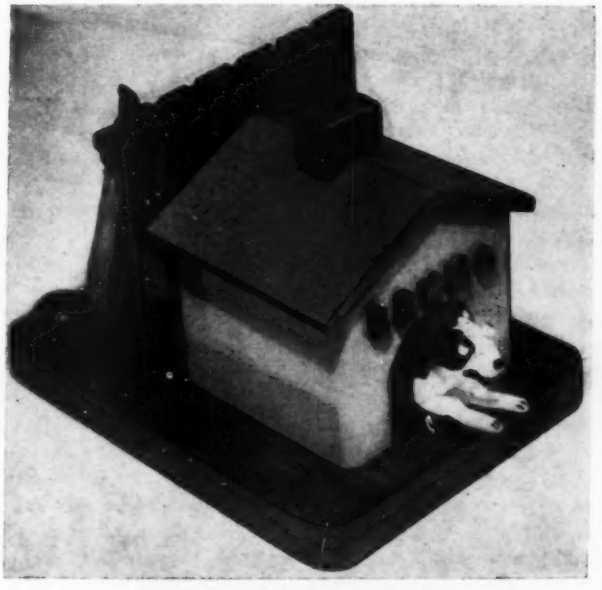
2. Assemble house with 1-in. brads and glue.

3. Line house with thin gauge aluminum.

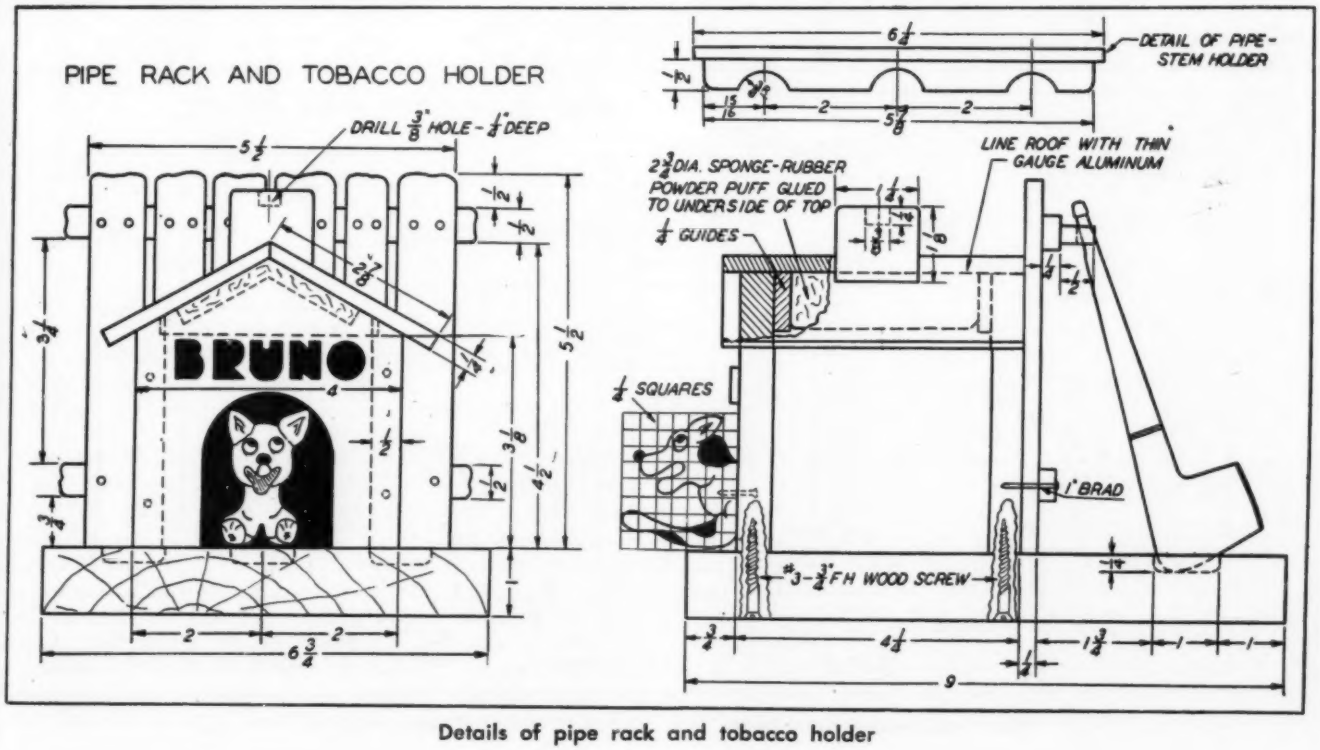
Roof

1. Select a piece of basswood and make two pieces ¼ by 2⅞ by 4½ in., and glue together. Make sure that they fit the shape of the top of the house.

2. Cut chimney from soft white pine as



Pipe rack and tobacco holder


PIPE RACK AND TOBACCO HOLDER
DRILL 3/8" HOLE - 1/4" DEEP
BRUNO
DETAIL OF PIPE-STEM HOLDER
2 3/4 DIA. SPONGE-RUBBER POWDER PUFF GLUED TO UNDERSIDE OF TOP
1/4 GUIDES
LINE ROOF WITH THIN GAUGE ALUMINUM
1/4 SQUARES
1" BRAD
#3 - 3/4" F.H. WOOD SCREW

Details of pipe rack and tobacco holder

per working drawing, and fasten to top of roof with No. 3 by ½-in. f.h. screws.

3. Fasten two ¼-in. guides as per working drawing, to underside of roof and line roof with thin gauge aluminum.

4. Glue a 2¾-in. dia. sponge-rubber powder puff to underside of roof. Sponge retains moisture for humidor.

Fence

1. Select a piece of Douglas fir plywood ¼ by 5½ by 5½ in., and mark off fence posts down to ¾ in. from bottom edge.

2. Jig-saw individual posts leaving complete fence intact.

3. Fasten rails (plywood) to fence posts with ½-in. nails as per working drawing.

4. Add pipe-stem rack to back side near top of fence.

5. Apply light oak oil stain and allow to dry.

Base

1. Select a piece of knot-free soft white sugar pine 1 by 6¾ by 9 in.

2. Locate pipe bowl wells and gouge out same with half-round carving tool.

3. Trim a ¼-in. radius on all four corners of base and smooth entire base with Nos. 1, ½, and 0 flint paper.

Dog

1. Select a piece of soft white sugar pine 1 by 2 by 2 in., and transfer side view of dog to it.

2. Jig-saw side view and mark off a top view.

3. Carve the top view with a pocketknife.

4. Round all corners, shape to best of your ability, and sand thoroughly.

5. Shellac dog, then apply enamel.

6. Use large headed white pins for eyes — small dot of black enamel for pupil of eye.

7. Do not fasten dog to house with nail and glue until house is entirely finished.

Assemble

1. Fasten house to base with four deeply countersunk No. 8 by 1¼-in. f.h. wood screws.

2. Fasten fence to house with glue and ¾-in. brads.

3. Cut name of dog (block style letters) out of 3/16-in. plywood and enamel bright red. Outline letters with black enamel.

4. Do not glue letters to house until house is entirely finished.

Finish

1. Give entire project two coats of shellac, cut ½ alcohol, and sand No. 2/0 between each coat.

2. Pour yellow enamel into pan and allow it to get slightly thick. Apply this enamel to house.

3. Using same enamel technique, enamel roof green, chimney red, and doorway black.

4. Fasten letters and dog to house.

5. Wax entire project and rub to smooth luster.

INDIAN SILVERSMITHING

BEN HUNT

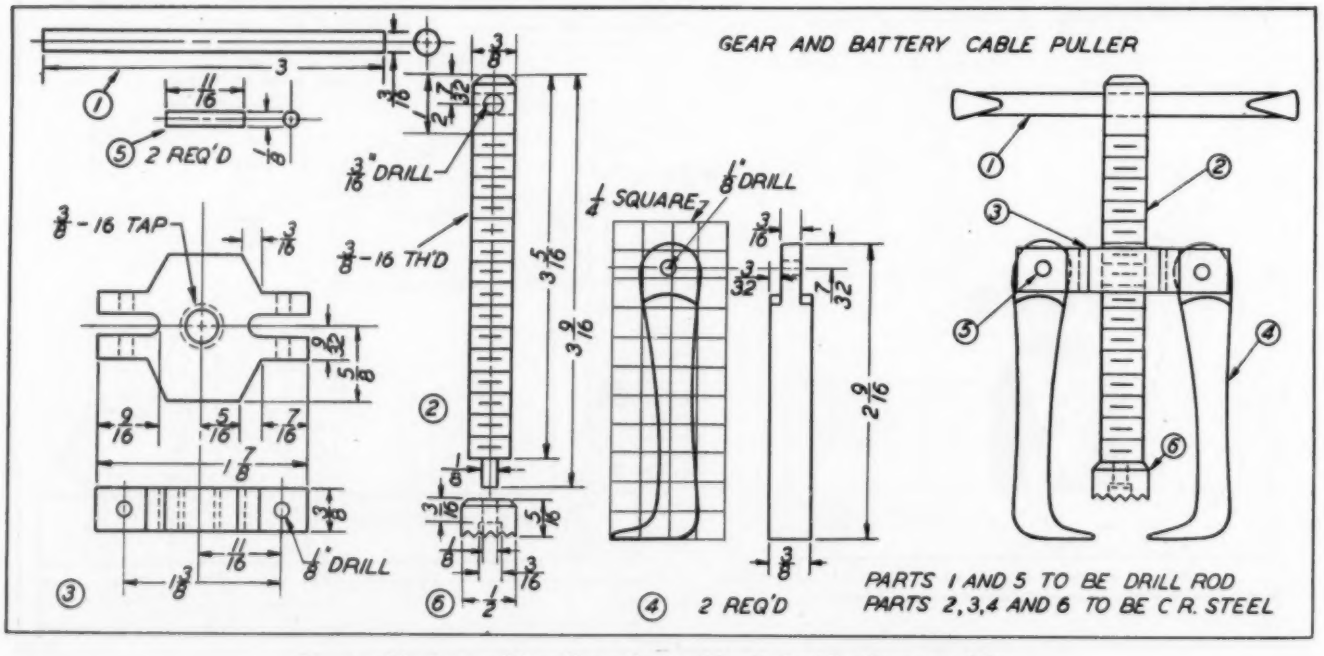
Hales Corners, Wis.

Ladies' Watch Bands and Bracelets

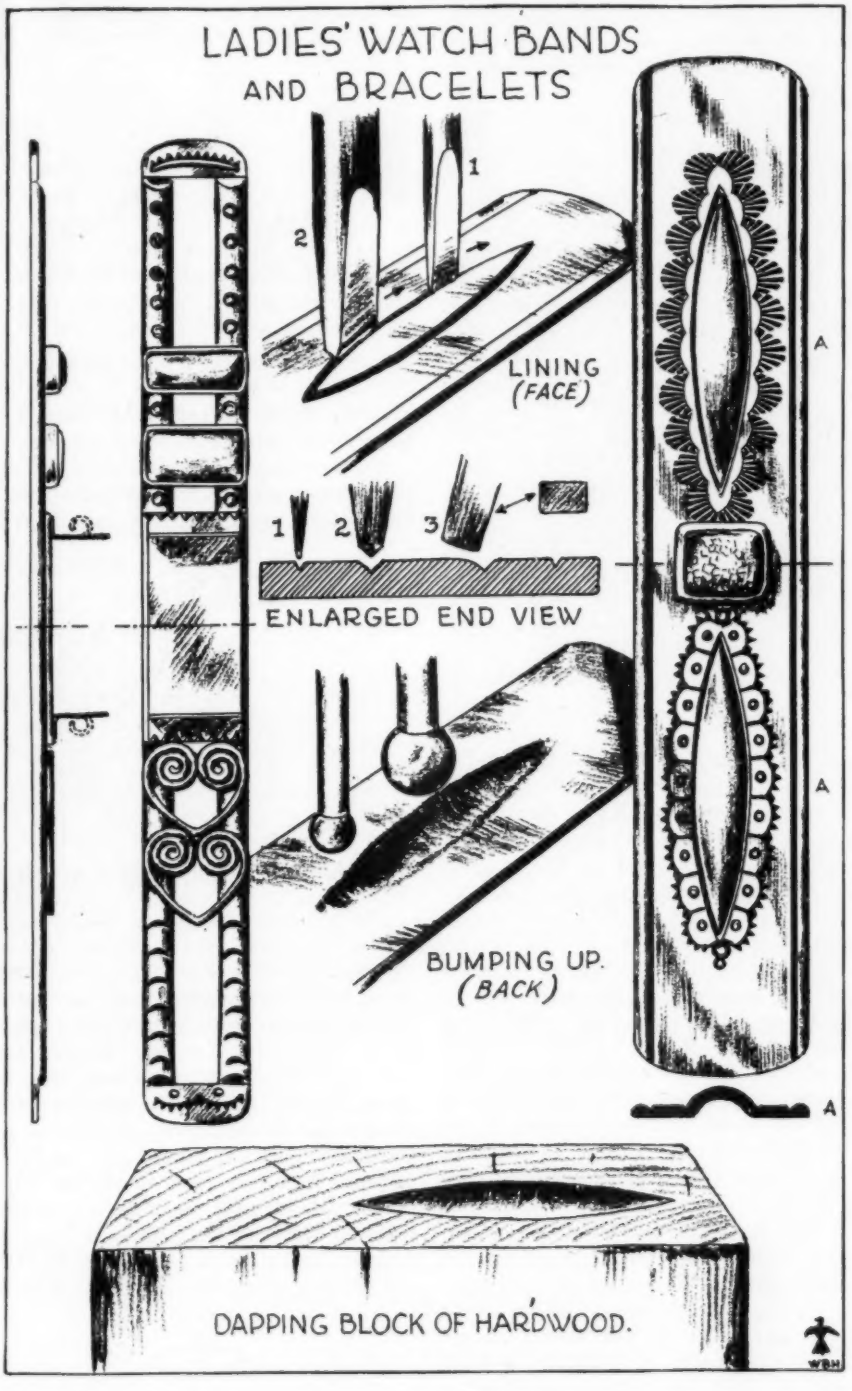
On pages 331–333 of the October, 1950, issue of this magazine is an article which explains how to make a man's wrist watch band. This wrist watch band aroused so much enthusiasm that it was decided to design a similar one for a lady's watch. The man's watch was of stainless steel which matched quite well with the silver of the watch. The lady's watch for which the band was designed was made of platinum, and it also matched up with the silver. Do not try to make a silver band for a gold watch. It just doesn't look right. The band shown in this article was made of two half round wires with ends of 16-ga. silver. A base plate of 16-ga. silver was used onto which the brackets were soldered. In this case, there were no pin bars, so the brackets of 24-ga. silver were simply bent around the stationary bar. There are two designs offered. The one having four oblong deep rich blue turquoise gems, which in this case were cut from one piece of stone. The other design shows a wire ornament.

The designs for the bracelets were adapted

Ladies' watch bands and bracelets



Gear and battery cable puller submitted by G. Barich, Cheyenne, Wyo.



from an old bracelet shown in a booklet on *Indian Silverwork of the South West,* published by the Laboratory of Anthropology, Santa Fe, N. Mex.

The Navahos made this type of bracelet of heavy silver hammered out of an ingot. The one shown in this article was made of 14-ga. silver.

Start by lining the edges and the outline of the bump up, first with a rather fine liner and then with a heavier one. Then round up the inside edge of the bump up as shown in the central drawing at No. 3. These rounding-up marks show clearly on many old pieces of similar design. It saves a lot of filing later on. Next stamp around the portion that has been bumped up. Then turn the blank over and bump it up with dapping die stamps, made of ball bearings soldered to drill rod. Use the larger one to bump up the central part and the smaller one for the ends. When bumped up sufficiently bend the band slightly and finish up with a file and an emery stick, such as was described on page 293 of the September, 1951, isue. Then solder the bezel, bend the band, set the stone, and polish. Two designs are shown.

GRINDING AND SHARPENING WOOD-TURNING TOOLS

E. D. MEYER
Associate Professor
Oregon State College
Corvallis, Ore.

The number and variety of turning tools in a set may vary greatly. The sizes will be governed by the judgment and skill of the workman and the type of turning to be done with them. Certain tools are essential in each set but variations in their size will have little effect on their maintenance. The following list comprises the tools most frequently used: gouges, skews, round-nosed and straight-edged scrapers, diamond or spear pointed scraper, parting or cutoff tool, and probably the right and left skewed scrapers. Turning tools are usually neglected and subjected to hard use; consequently they are in need of frequent sharpening.

The Gouge

The gouge is the first cutting tool to be used and is probably the most difficult to grind and sharpen. If it were used entirely for rough turning the shape of its cutting edge would not be too important, but as it is also used for turning coves and curves, it must be properly fashioned, as shown in sketches.

The problem in the maintenance of turning gouges is to grind and sharpen them properly. Turning gouges are ground with the bevel on the outside in much the same manner as straight chisels and plane bits are ground. A little practice will be necessary before a uniform bevel can be ground. Extreme care should be used to avoid overheating and damage to the cutting edge.

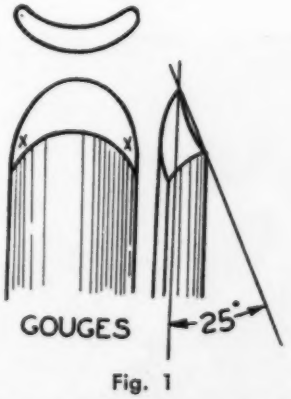


Fig. 1

Grind the bevel at approximately 25 deg., and hollow grind it to reduce the amount of whetting necessary. There should be no abrupt

Fig. 2. Whetting the gouge

ending of the bevel at the edges (see points marked X in Figure 1), and no mass of metal left there. The bevel continues in a curve to match the cutting edge. When a gouge is used to form coves, too much metal at the edges would be a hindrance.

Whetting or sharpening the cutting edge of a gouge requires painstaking effort. A rounded edge slip stone should be used. A fine carborundum or India slip stone will produce edges keen enough for turning gouges. The manner of whetting the edge is as important as the oilstone with which it is done. Improper whetting can quickly nullify good grinding.

Hold the gouge on the slip stone as shown in Figure 2, with the cutting edge visible at all times. If the gouge is held at an angle of about 60 deg., close to the chest, and the slip stone held in the other hand, many of the difficulties of honing can be easily overcome. Hone the heel of the grind or bevel by keeping the hone in constant contact with it. With each stroke or two of the hone bring it in contact with the cutting edge while still maintaining pressure at the heel of the bevel. This whetting will form a wire edge along the cutting edge on the inside of the gouge. Reverse the gouge and hold the entire length of the slip stone against its concave surface, as shown in Figure 3, and hone carefully. Much harm can be done if the hone is not held flat against the concave surface during this process. It is very important that no bevel be formed near the cutting edge on the inner surface of the gouge. Continue to hone the bevel and the inner surface of the gouge until the wire edge is removed and a sharp edge obtained.

Fig. 3. Removing the wire edge

Skews (Turning Chisels)

After the gouge has made the wood round, the skew or turning chisel is used to smooth the surface and to cut a great variety of shapes. Skillful use of the skews requires considerable practice. Many of the difficulties encountered with them are due to improper sharpening.

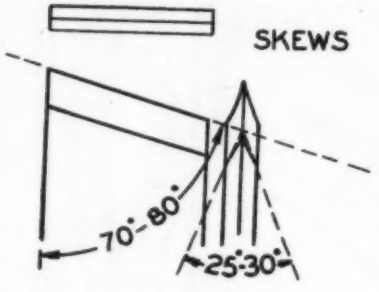


Fig. 4

As the name implies, the cutting edge is not square with the sides but askew at an angle of 70 to 80 deg. It is ground from both broad sides with two equal bevels and their included angle should be 25 to 30 deg. Hollow grind the bevels as shown in Figure 4, and whet them with care in the same manner as a plane bit or bench chisel is sharpened. One of the most common causes of mishaps with the skew is the careless honing with a slip stone. Without due care the chisel near the cutting edge becomes rounded and thick which in turn causes the operator to raise the handle of the skew in an effort to make it cut and the result is often a *run*, a difficulty very well known to wood turners. Proper grinding and whetting as shown in Figure 4 will assure a tool which in the hands of a competent workman will cut as it should.

The skew is sometimes incorrectly used as a scraper but does not serve well in that capacity; if a scraper is necessary, have one at hand and use it for scraping.

Scraping Tools

The scraping tools shown in Figure 5 are very important particularly when turning on faceplates. Their shapes and sizes are governed by the work to be done with them and the workman should not hesitate to change the shape of the cutting edge to suit the job.

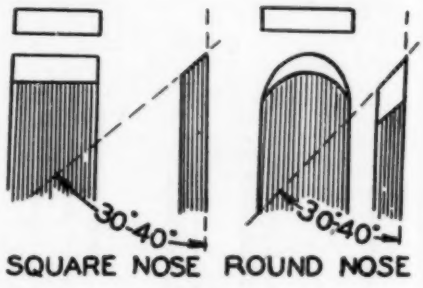


Fig. 5

Straight scrapers are ground and sharpened in the same manner as the bench chisels with the difference that the angle is about 30 deg.

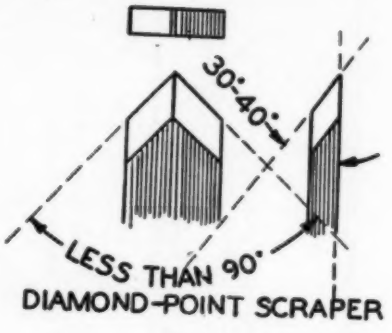


Fig. 6

The diamond or spear-pointed scraper is one of the most useful scraping tools. Some wood turners prefer a right and a left skew in place of the diamond-point scraper. The right and left skews should not be confused with the skews discussed above. The diamond point and the skew scrapers, in contrast to the skews mentioned above, are ground with one bevel only and the angle is 30 to 40 deg. The shape of the diamond point should be as shown in Figure 6. Note that the angle at the point is less than 90 deg., so that it can be used without difficulty in faceplate turning and wherever

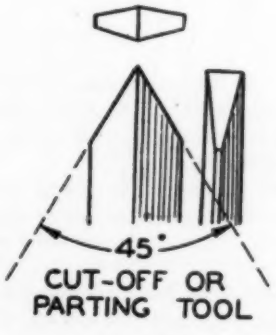


Fig. 7

an obtuse angle would be objectionable. The two sides of the point need not be of equal length.

Round-nosed scrapers are ground to any curve or shape demanded by the job at hand; at times a blunt curve is needed and at others a small radius must be used. Grind the curve at about 30 deg., similar to the angle of the other scraping tools. Because its cutting edge is curved, it should be sharpened with a slip stone and not on a large flat oilstone.

The cutoff, parting, or sizing tool is ground and whetted from its two narrow edges. The included angle at the point is 45 deg., and the two sides of the angle should be of equal length. Grind them hollow to gain that advantage when sharpening the tools and hone them on a bench oilstone.

LINOTYPE OPERATOR'S TIMESAVER DEVICE—THE PI STACKER*

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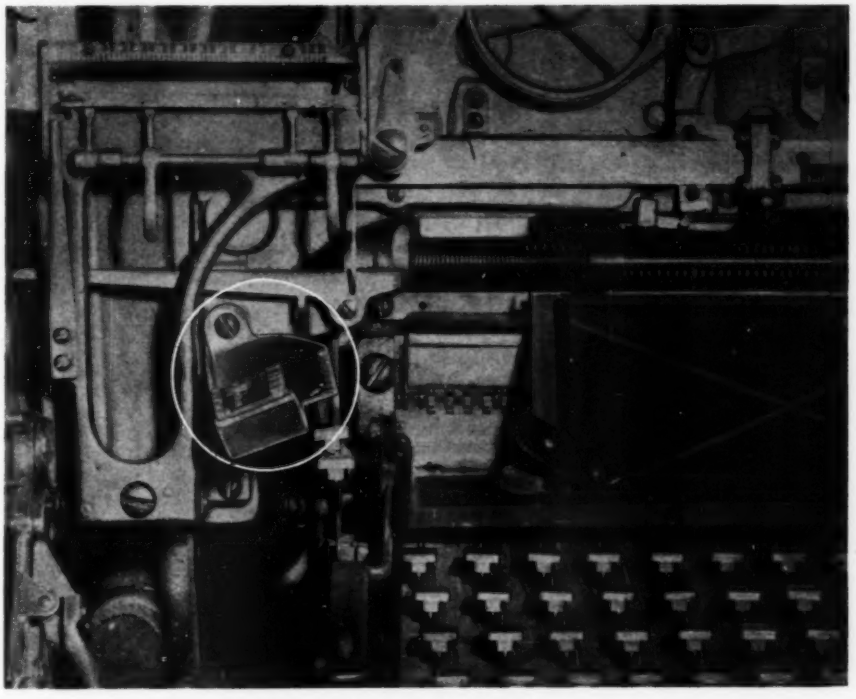
Mechanic Arts Division
Florida A. and M. College
Tallahassee, Fla.

To a linotype operator setting fast composition, the *pi stacker* serves as a real timesaver. It reduces the distance traveled by the hand in removing matrices from the assembling elevator to a convenient place nearby. The distance saved is approximately 10 in. Moreover, it eleminates the necessity of assembling scattered matrices by hand in order to run them back into the magazine.

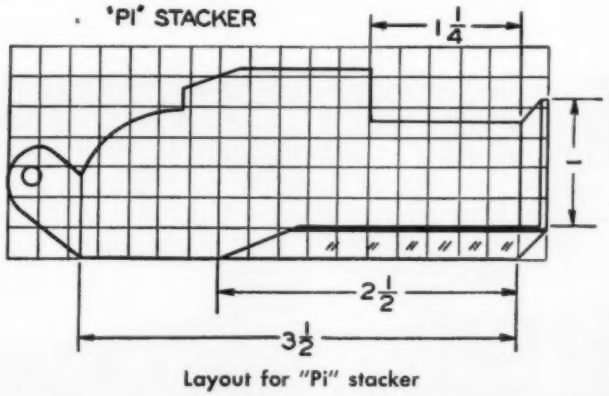
The factor that qualifies the *pi stacker* as a metal shop project is that unless all the linotypes are exactly the same models, an individual pi stacker will have to be made for each machine. The one shown in the drawing is for the model 14.

Such an attachment may be made from a discarded composing stick or from heavy gauge metal. If heavy gauge metal is used, one should use the 7-in. composing stick as a pattern. The angle at which the device is attached to the machine will be determined by the model of the linotype and auxiliary attachments. The pi stacker is easily attached as follows: Remove the upper of the two bolts immediately beneath the short auxiliary rail lever (in the assembly elevator); place this bolt through the hole in the pi stacker and fasten to the machine by screwing the bolt into its original position. Raise the assembly elevator several times to see that everything clears the device; also, be sure that space bands in the assembly elevator clear the device too.

This idea is not presented as an *improvement* of the linotype machine, but merely as a helpful gadget.



Pi stacker attached in place



Layout for "Pi" stacker

* Idea obtained from C. Cedric Givens, *Tampa Bulletin*.

MORTISE GAUGE

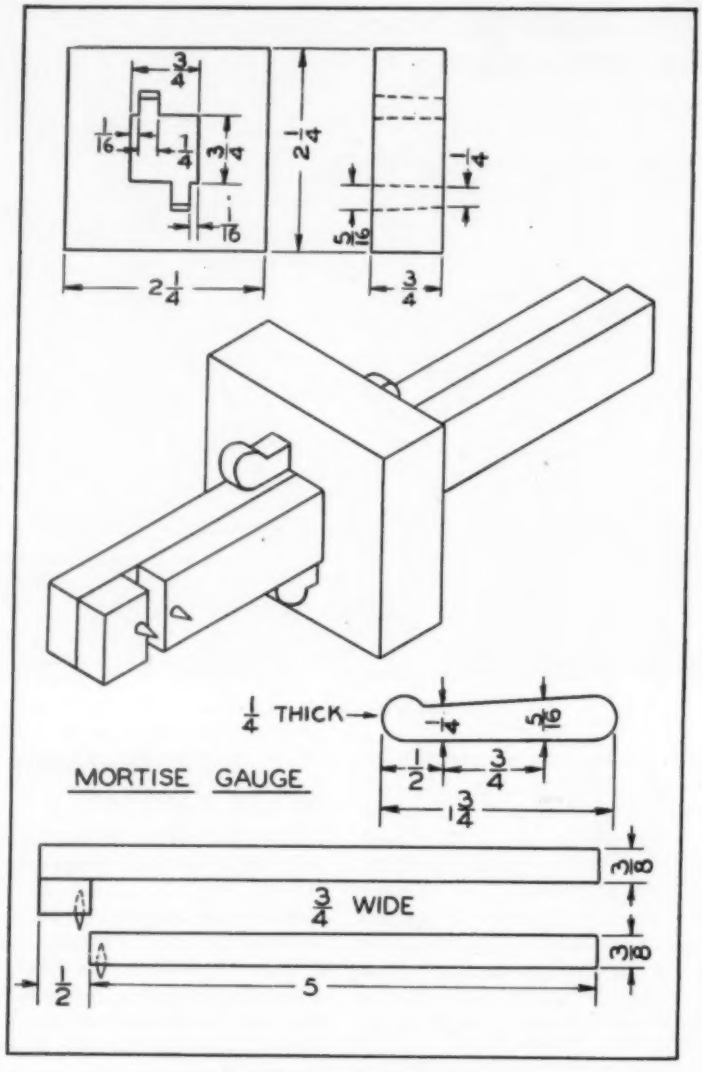
PERCY W. BLANDFORD
Gibbons Secondary School
Willesden, Middlesex, England

This mortise gauge has proved to be popular with boys who have spent about a year in the woodwork shop. The wedge action for locking the sliding parts is unusual in modern tools, but it is effective and simple to make.

Any close-grained hardwood can be used. The two sliding parts should have a ¾-in. square section when put together. The block for the backpiece is best joined to it with synthetic resin glue. The two marking pins are ordinary nails, driven in and cut off to leave about ⅛ in. projecting. This projection is then filed to a round or chisel-shaped point. To avoid risk of splitting, holes should be drilled for the nails and the nails driven before the wood is trimmed to length. The nails should be a little less than ⅛ in. from the meeting edges of the wood, so that ¼-in. mortises can be gauged.

The block is shown as a square, but it could be made D shape or oval. Mark out the central square on the block on both sides; and remove most of the waste by drilling, then trim to an easy fit on the sliding parts by chiseling. Cut the wedge slots so that they bear centrally on the parts they lock.

Make the wedges by first planing a strip of the right thickness, then obtain the correct bevel by marking out the center of a wedge first (see wedge drawing). Extend this bevel



Details of mortise gauge

about ½ in. each end and shape as shown.

Hand pressure will usually be sufficient to lock the wedges, but a light hammer blow may sometimes be needed. If another point is driven into the other side of the back sliding piece, the gauge can be turned over and used for marking single lines.

A NOVEL TOY CHEST

HOWARD J. MEYER
Industrial Arts Faculty
State University of New York
Lockport, N. Y.

How about a novel but useful project that can be made from both discarded and new materials encompassing a variety of material areas.

This child's toy chest made to resemble a drum can be constructed from a discarded cylindrical paper container cut off to the desired height and dressed up with the aid of paint and cord.

Construction is extremely simple, only a few basic tools are necessary, yet upon completion the project resembles a professional piece of work.

1. To construct the project, secure a used cylindrical paper container, approximately 20 in. in diameter and with a metal cover, if possible.

2. Cut the container off at approximately 18 in. from the top. To give the open end the most rigidity possible, it is wise to retain the top end with the metal bead as the top end of the toy chest.

3. Out of a piece of ½-in. or ⅝-in. plywood, or 1-in. board edge glued together, cut out a bottom which will fit tightly into the drum and which will allow the paper board sides to be nailed to the bottom.

4. To protect the paper board from becoming damaged at the outside bottom of the drum, fasten a band of metal linoleum seam binding around the base of the drum.

5. To locate holes for anchoring the leather loops which hold the cord, divide the top outside edge of the drum into 11 or 12 sections and mark with a pencil. Do the same with the bottom outside edge of the drum, having the bottom marks fall between and exactly in the center of the marks at the top. On these marks and two inches from the top edge, as well as two inches from the bottom edge, drill holes of 3/16 in. in diameter.

6. Paint the drum both inside and out with a color such as red, green, or blue. Paint a white band 2½ in. wide both on the top as well as on the bottom of the drum.

7. To make the leather loops, which hold the cord, obtain some scrap leather such as is found in purses or old shoes. Cut strips

Simulated drum toy chest

of leather ⅞ to 1 in. wide and 2¼ to 2½ in. long, depending on the diameter of cord used. Round the ends of each strip and punch a 3/16-in. hole in each end of the strip. These individual pieces of leather should be folded end to end and then fastened to the sides of the drum with 3/16 by ½-in. r.h. stove bolts, furnished with nuts and washers.

8. Thread the cotton cording through these loops and sew the ends together. This cording can be ⅜ or ½ in. in diameter and, if used on a 20-in. diameter drum, about 6 yards will be necessary. If white cotton cording is unobtainable, then sash cord could be used.

Making the Cover

1. If the original metal cover is to be used, reinforcing will be necessary to provide maximum rigidity. This can be done by cutting a circular portion of plywood ¼ to ⅜ in. in thickness with a diameter large enough to cover the flat inner portion of the cover. This plywood can be fastened to the cover by means of No. 4 by ⅜ in. r.h. wood screws driven through the metal cover into the plywood.

2. Paint the cover the same color as the banding on the side of the drum. Preferably this should be white.

3. In making the *drumstick* handles, it is wise to turn the drumsticks on the lathe, making them a larger diameter than regulation size for drumsticks to provide greater strength and also to make the sticks look more in proportion to the drum.

The size sticks turned in this particular case are 15 in. in length, 1 3/16 in. in diameter on the straight end, tapering down to 7/16 in. just before the knob, with the knob ¾ in. in diameter at the largest point and 1⅛ in. long.

Sticks should be crossed about 3½ in. from the end of the straight portion with the lower stick notched out to a depth of about ¼ in. to receive the upper stick.

A ¾-in. dowel, about ¾ in. in length and cut on a slight angle, should be fashioned as a form of jack to elevate the crossed portion of the sticks above the drum cover.

This piece of dowel is mounted directly under the cross, and the sticks positioned on the cover of the drum. When everything is positioned properly, then drill a 3/16-in. hole directly through the cross, the dowel and the cover. A 3/16 in. by 3-in. r.h. stove bolt should then be put through the hole and tightened in position.

The position of the knob end of the sticks should then be noted and a ⅛-in. hole should be drilled through the drum top directly under the center of the knobs. The knob ends of the drumsticks are then fastened into place with No. 4 by ¾-in. f.h. wood screws started through the underside of the cover and screwed into the knob end of the sticks.

The sticks can be finished in natural merely by applying a clear brushing lacquer or white shellac.

BILL OF MATERIAL

Base

1. One used cylindrical paper container, complete with cover.
2. 1 piece ⅝ or ¾-in. plywood, approximately 20 in. in diameter for the bottom.
3. 6-ft. metal linoleum seam binding to reinforce bottom paperboard edge of drum.
4. Approximately 22 pieces leather, 1 in. wide and 2¼ or 2½ in. long.
5. 22 r.h. stove bolts size 3/16 by ½ in. complete with washers.
6. 6 to 7 yards of ⅜ or ½-in. diameter cotton cording (sash cord could also be used).

Cover

1. 1 piece ¼ in. or ⅜-in. plywood, approximately 18 in. in diameter to reinforce cover.
2. 20 r.h. wood screws No. 4 by ⅜ in.
3. 2 pieces of doweling, ⅞ in. in diameter and 16 in. long. Maple or birch for drumsticks.
4. 1 piece of doweling, ¾ in. diameter and ¾ in. high for jack under drumsticks.
5. 1 stove bolt, 3/16-in. diameter and 3½ in. long to fasten the crossed drumsticks to cover.
6. 2 flathead wood screws, No. 4 by ¾ in. to fasten knob end of drumsticks to cover.

Finishing Materials

1. Paint (2 colors).
2. Lacquer or white shellac.

STEEL HACK SAW

LELAND G. STROMBOM

Sycamore Community High School

Sycamore, Ill.

The hack saw, illustrated and described here, was designed in our drafting department. It was then turned over to the gas welding area in our general metals class. We completed two saws with different type handles and feel that the steel handle is more practical. Twenty boys have completed saws of this type in our shop. We know that this project has a definite place in a metal shop for the following reasons:

1. It involves several bench metal operations such as filing, sawing, bending, and grinding.

2. It offers fine opportunities for welding and heating. There are six different welds on the frame that present the student with a little variety in the type of welding required.

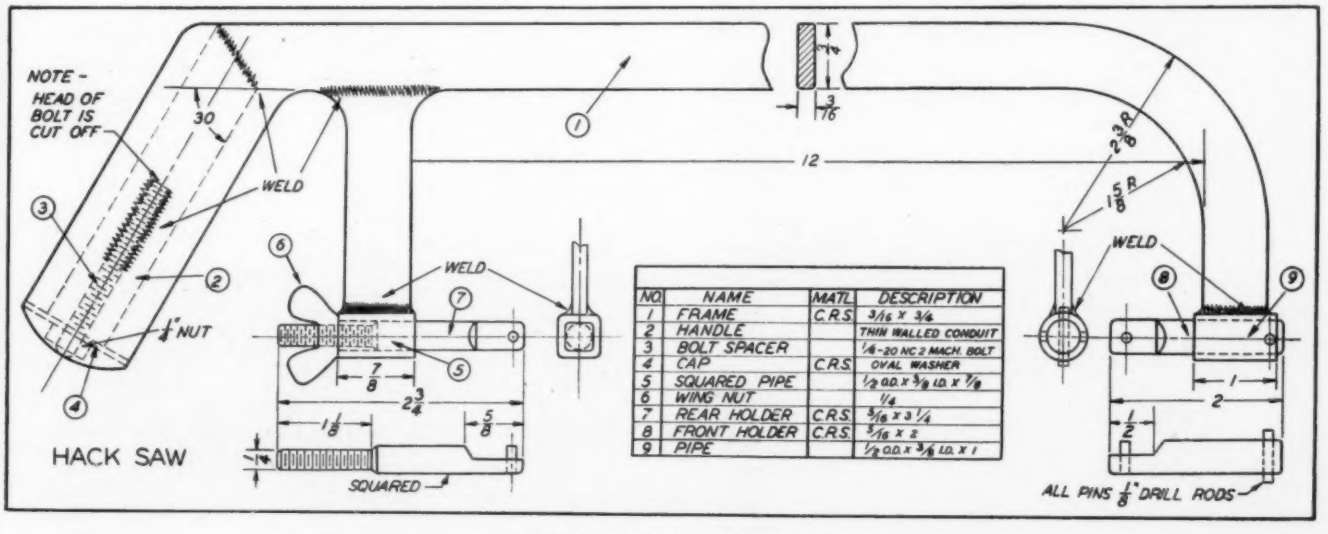
3. This project is inexpensive; all of the materials can be secured in the local junk yard. This places it within the financial reach of all students.

4. In addition it has utility and is a very useful tool in the home workshop.

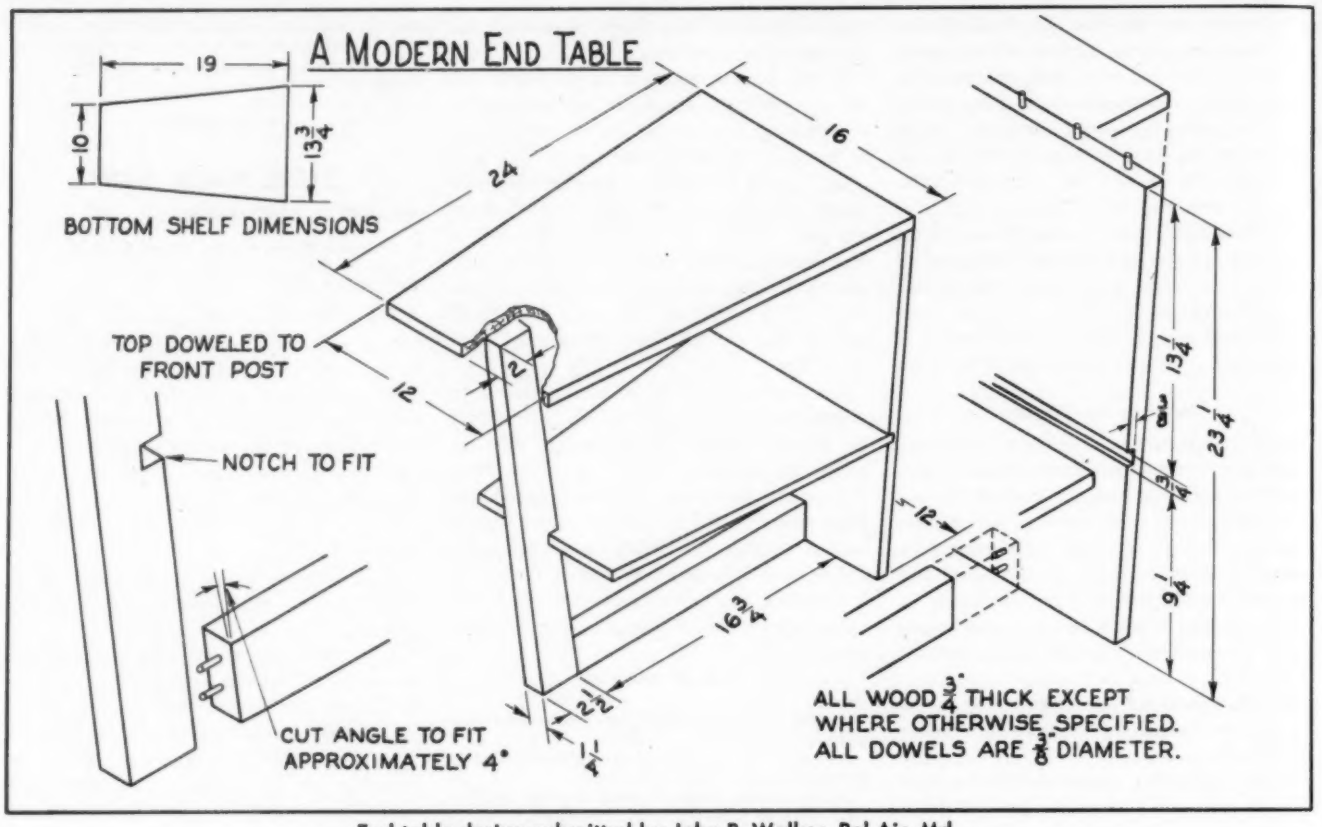
5. It fits into a gas welding course of study very well. There is a dearth of good useful projects in this area.

6. This hack saw frame is very durably constructed and will give good service.

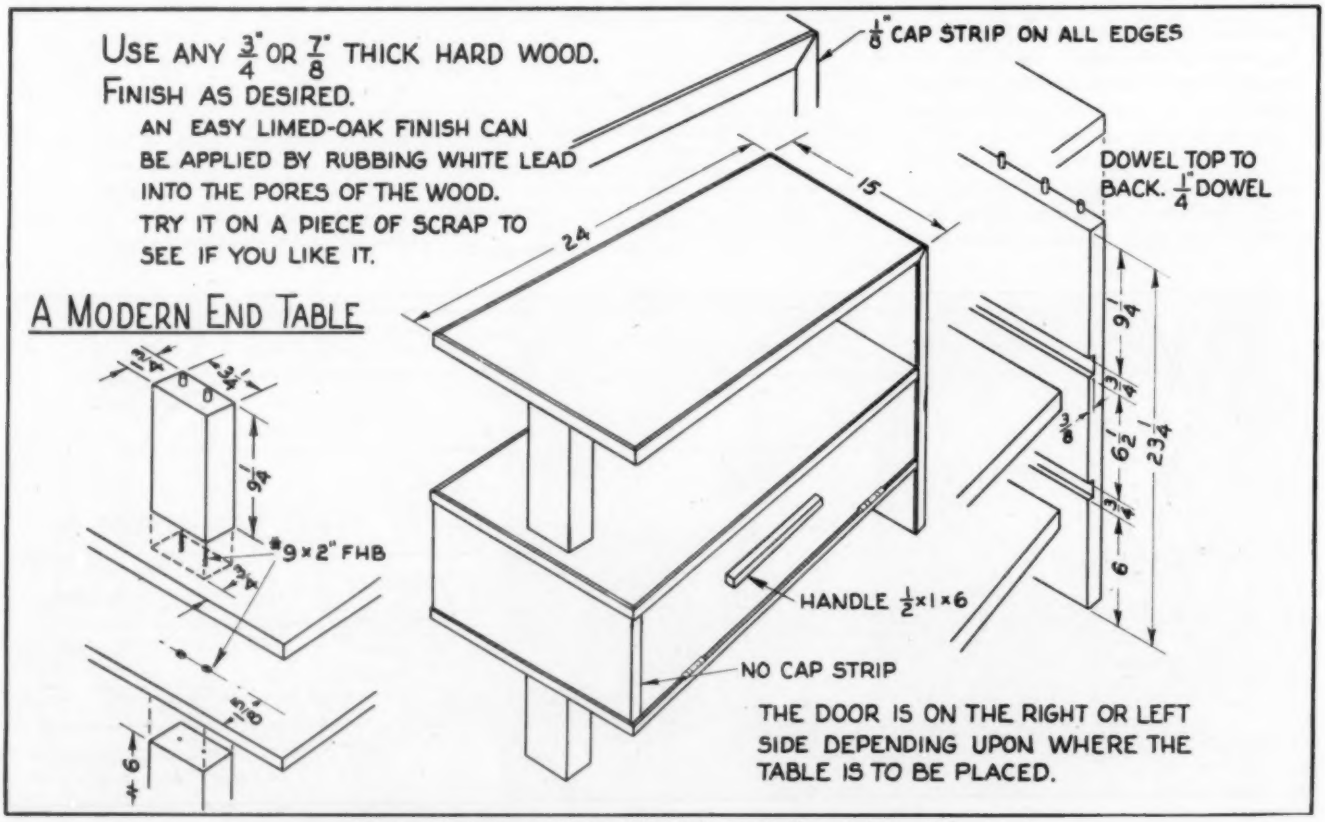
Students respond very enthusiastically to this project and we hope that other metal classes will enjoy the same enthusiasm.



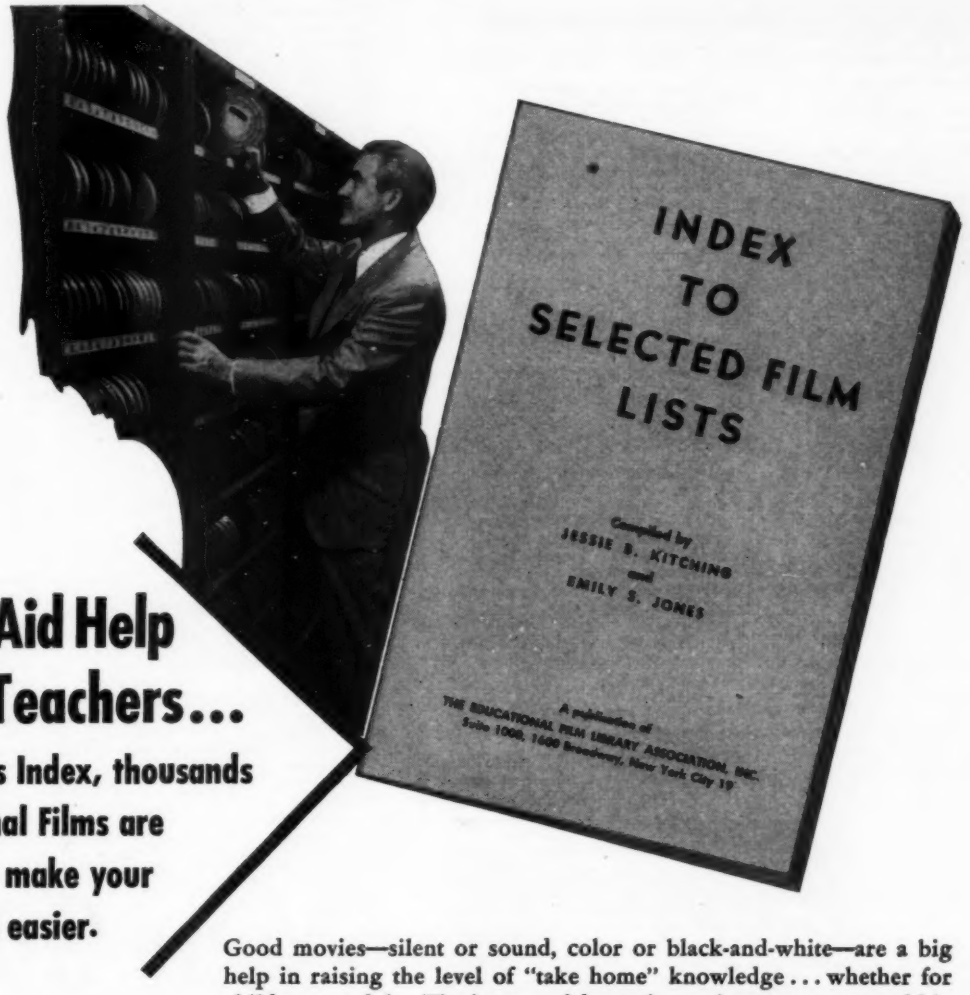
Details of steel hack saw



End table design submitted by John R. Walker, Bel Air, Md.


USE ANY 3/4" OR 7/8" THICK HARD WOOD.
FINISH AS DESIRED.
AN EASY LIMED-OAK FINISH CAN BE APPLIED BY RUBBING WHITE LEAD INTO THE POORES OF THE WOOD.
TRY IT ON A PIECE OF SCRAP TO SEE IF YOU LIKE IT.
A MODERN END TABLE
1/8" CAP STRIP ON ALL EDGES
DOWEL TOP TO BACK. 1/4" DOWEL
15
24
9 1/4
3/4
3/8
6 1/2
23 1/4
6
9 x 2" FHB
HANDLE 1/2 x 1 x 6
NO CAP STRIP
THE DOOR IS ON THE RIGHT OR LEFT SIDE DEPENDING UPON WHERE THE TABLE IS TO BE PLACED.

End table design submitted by John R. Walker, Bel Air, Md.



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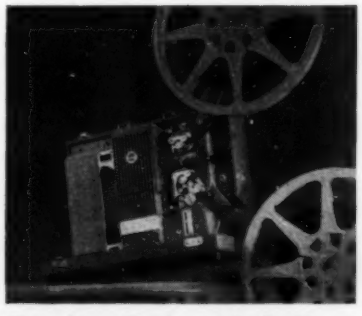

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(Continued from page 128)

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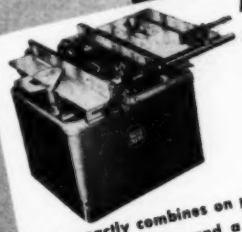

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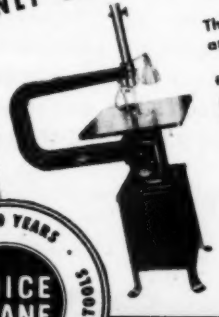

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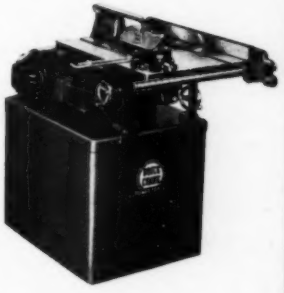

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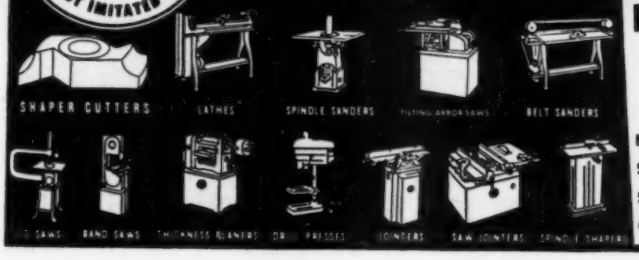

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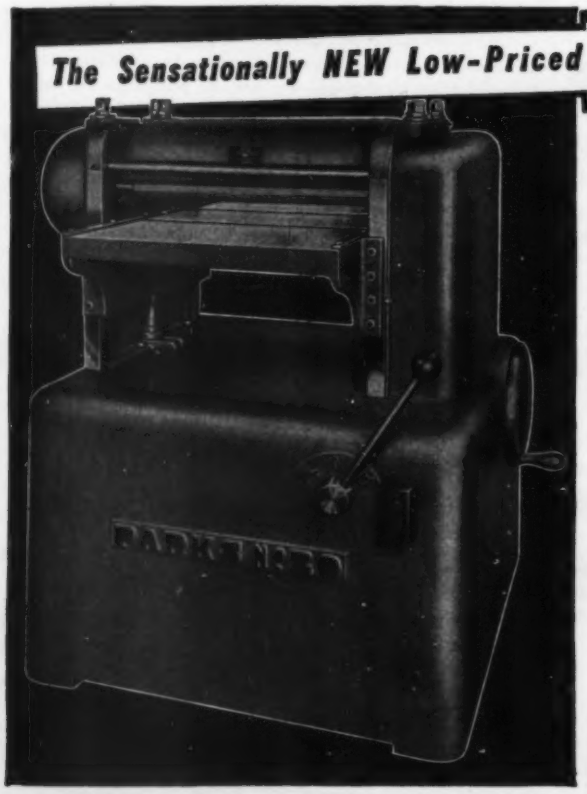

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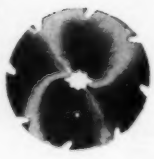

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United States Department of Agriculture (Bureau of Plant Industry, Soils, and Agricultural Engineering)
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Prevention and Control of Decay in Dwellings (Technical Note No. 251)
Reduction of Decay Hazard in Basementless Houses on Wet Sites (Forest Pathology Special Release No. 30)
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United States Department of Agriculture (Forest Products Laboratory)
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(Continued on page 26A)

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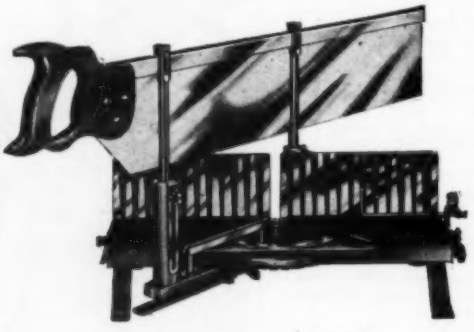

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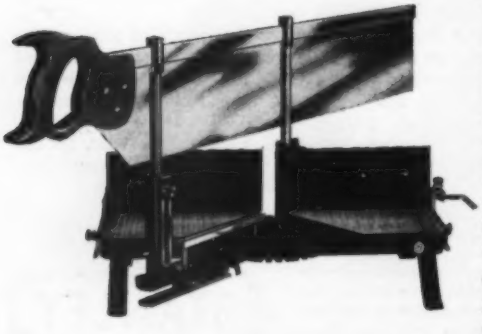

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PERSONAL NEWS

(Continued from page 8A)

♦ DR. C. S. ANDERSON, professor of agricultural education at the Pennsylvania State College, has been awarded a research professorship in the United Kingdom under the provisions of the Fulbright Act, according to announcements made by the U. S. Department of State and the Conference Board of Associated Research Councils in Washington, D. C.

♦ ALEX V. HANEL, teacher of woodwork at the Boys' Technical High School, Milwaukee, Wis., retired in June, 1951.

Before starting his teaching career, he was a patternmaker, having served an apprenticeship in that trade. He started his teaching career at the Boys' Technical High School on October 1, 1919.

His present address is 804 W. 7th St., Corona, Calif.

♦ DR. ARTHUR K. GETMAN, New York State Assistant Commissioner for Instructional Services (Vocational Education), retired on February 1, 1952, after nearly 41 years in public education.

He is a graduate of Cornell University (1911), and served successively as an agricultural education teacher at State Teachers College in Cortland, N. Y., Supervisor and Chief of the Bureau of Agricultural Education in the State Education Department, and assistant commissioner, with two years of service (1918–20) as associate professor on the Rutgers University faculty.

♦ W. F. FAULKES, chief of the rehabilitation division, Wisconsin State Board of Vocational and Adult Education, retired from his post on December 31, after 30 years of service.

Mr. Faulkes was honored with a testimonial banquet at the Lorraine Hotel in Madison on December 1.

♦ WILLIAM A. SARGENT was named Emeritus Professor of Engineering Shop by action of the board of education, October 23, 1951. A fifty-year veteran of the Detroit school system, Professor Sargent served as head of the engineering shops in the College of Engineering from 1934 until his retirement in June, 1951.

♦ ARTHUR ANDERSON, a graduate of Michigan State College, is now teaching general wood shop at Oxford Junior High School in Dearborn, Mich.

♦ WILLIAM J. FISCHER, New Jersey State Supervisor of Trade and Industrial Teacher Training in the Vocational Division, died on April 9.

Prior to Mr. Fischer's appointment to the vocational division of the New Jersey State Department of Education, he served as an instructor in the Middlesex County, N. J., vocational schools.

(Continued on page 26A)

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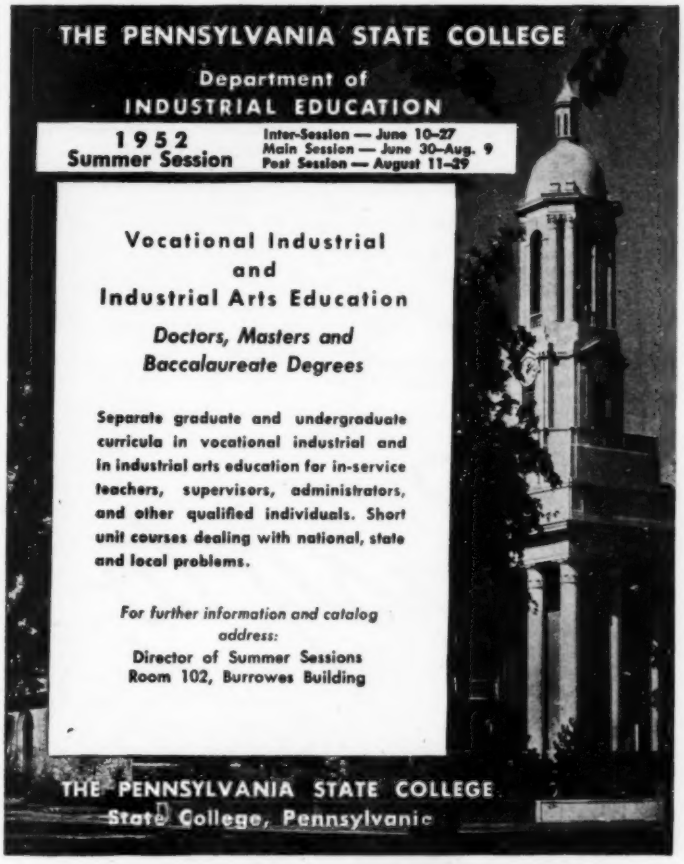
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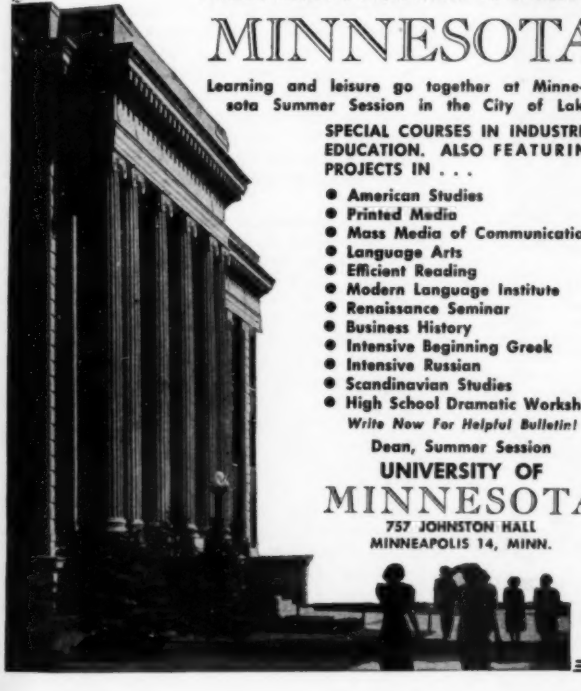

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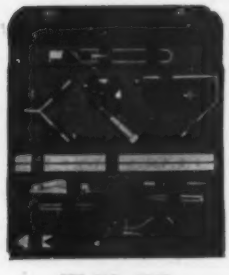

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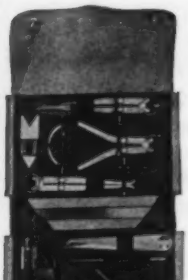

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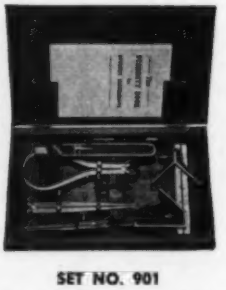

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PERSONAL NEWS

(Continued from page 24A)

He was an active member of the New Jersey Vocational and Practical Arts Association and the American Vocational Association.

♦ Dr. Charles P. Scott, professor of vocational education, has been appointed director of courses in vocational education, at the University of Pittsburgh, Pittsburgh, Pa. He succeeds Dr. Anthony Goldberger, who retired last May after more than twenty years of service at the University.

♦ Ralph K. Beamer was promoted from instructor to assistant professor of vocational education at the University of Pittsburgh, Pittsburgh, Pa.

♦ A. Joseph Pumphrey has been appointed as principal of the Wilson General Vocational School No. 294, Baltimore, Md.

He became a teacher in the Baltimore public schools in 1928. He served as principal of Occupational School No. 3 from 1938 to 1943, at which time he became principal of the Seipp General Vocational School No. 297, where he served four years before entering upon five years of service in the business division of the public schools.

♦ Bernard J. Kennedy has been appointed supervisor of industrial arts and vocational education for the Grand Rapids public schools, Grand Rapids, Mich. He replaces Arthur Reagh, who retired.

♦ Dr. John Theodore Rettaliata, vice-president and dean of engineering at Illinois Institute of Technology, has been made president of the Institute.

He succeeds Dr. Henry T. Heald, who will leave Chicago to become chancellor of New York University.

♦ D. D. Simmons, holder of a master's degree from Oklahoma A. & M. College, and an advanced graduate degree from Missouri University, has been made instructor of woodworking at Memphis State College, Memphis, Tenn. For the past five years Mr. Simmons has been teaching in the high school at Rapid City, S. Dak.

♦ Alva Tabor, head itinerant teacher trainer for vocational agriculture in the Georgia Negro Schools, died suddenly on December 2, 1951.

He was well known and widely respected for his contributions to Georgia's program of vocational education for Negroes.

♦ Lawrence Borosage, assistant supervisor, trade and industrial education service, Ohio State Department of Education, was appointed lecturer in vocational education in the Department of Vocational Education and Practical Arts, School of Education, University of Michigan, Ann Arbor, Mich., effective July 1, 1951.

♦ Glenn Brooks is teaching industrial arts at Whitefish, Mont.

News Notes

♦ Applications for graduate assistantships, scholarships, and fellowships are being accepted for the fall, 1952, semester by Illinois Institute of Technology, Technology Center, Chicago 16, Ill., it was announced by W. A. Lewis, dean of the graduate school.

Graduate courses are offered in 28 fields, including engineering curricula, photography, design, public administration, building research, psychology, and art education.

Half-time and third-time teaching assistantships are available in all departments.

Fellowships, providing stipends of up to $1,500 a year plus tuition, are available in some departments.

Full tuition scholarships will be offered to exceptional students who want to study on a full-time basis.

Applications for assistantships, fellowships, and scholarships must be submitted by March 15.

♦ It is still time to enter the 1952 Industrial Arts Awards Contest promoted by the Ford Motor Company.

Entries may be submitted by any student from grades 7 to 12, both inclusive, and it is open to students from public, private, or parochial schools who are under 21 years of age by July 1, 1952. Projects entered must have been started and completed so they can be sent to Dearborn, Mich., or Salt Lake City, Utah, between May 1 and June 10, 1952.

For additional information, and Rules Handbook, write to *Industrial Arts Awards, Ford Motor Co., 3000 Schaefer Road, Dearborn, Mich.*

♦ In view of the contributions that Marshall Byrn has made to the field of industrial arts, his friends and associates have decided to establish a memorial award, the nature of which will be determined later. In order that this may be achieved, it was decided to establish a fund of $3,000 by friends, associates, and former students.

Anyone in sympathy with this project is asked to make out his check payable to the University of Michigan, and send it to Dean J. B. Edmonson, School of Education, University of Michigan, Ann Arbor, Mich.

♦ The Stout Institute, Menomonie, Wis., will begin the construction of its new library this spring. The building may be ready some time during the fall of 1953.

♦ H. H. Burlingham, teacher-trainer at the California State Polytechnic College, announces that three new high schools have been added to the California training program for teachers of vocational agriculture.

The Lompoc, Strathmore, and Selma Union High schools began active participation in the program, February 18. They join with nine other California high schools and junior colleges in providing a training center for Cal Poly cadet-teachers of vocational agriculture. On Monday, February 18, Cal Poly sent out 16 graduate students of agriculture to the various schools organized in the training program. According to Burlingham, the men will conduct their teaching duties throughout the spring semester.

In line with regulations established by the State Bureau of Agricultural Education, graduate students must complete a year of graduate work under the teacher-trainer program in order to apply for institutional recommendation for the special secondary credential. The secondary schools serve as a proving ground for the cadet.

(Continued on next page)

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TEACHING MATERIALS

(Continued from page 26A)

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(Continued on page 30A)

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NEWS NOTES

(Continued from previous page)

♦ A course in Shop Safety Education has been conducted for the past 15 weeks at Albany as an in-service extension course from Oswego State Teachers College in co-operation with the Industrial Teacher Training Program in the Capitol District.

Nine guest lecturers from the New York State Division of Safety, the New York State Insurance Fund, and safety engineers from the New York Telephone Company and the General Electric Company gave the class a wealth of information on safety laws, rules, regulations, and industrial practices to integrate into their own shop, laboratory, and classroom situations. Credit for the course was applicable to permanent certification, undergraduate degree credit, and local salary increment.

♦ The Educational Service Section of the Hammermill Paper Company has available a packet for making handmade paper. The new packet, which will be of interest to teachers of chemistry, printing, industrial processes, occupational therapy and the arts, consists of:

1. A 12-page, pocket size book entitled "How to Make Paper by Hand" which illustrates and describes 17 steps in making handmade paper.

2. A 5 by 7-in. piece of Fourdrinier paper machine wire.

3. Several sheets of ledger paper. These are helpful in carrying out two steps of the handmade paper project. Except for the "mold," ordinary kitchen utensils are the only equipment necessary.

To cover part of the preparation and handling costs, Hammermill charges 25 cents each for the packets. Address orders for the packet to: *Educational Service Section, Hammermill Paper Company, Erie 6, Pa.* It will be helpful to mention this magazine.

♦ The Industrial Arts Division of Wisconsin State College at Platteville will conduct an Industrial-Arts Clinic, July 14 through 18, for the upgrading of industrial-arts teachers. Demonstrations and individual work in graphic arts and printing; machine shop; welding; sheet metal; auto mechanics; art metal; wood carving; woodworking; woodcraft; wood finishing; plastics; leatherworking and other crafts; drafting; teaching problems in industrial arts; shop equipment and machines; and visual education. Fee $5 for the week. 1 credit. Rooms and trailer camp for nominal charge. Evening meetings for informal discussions of teaching problems.

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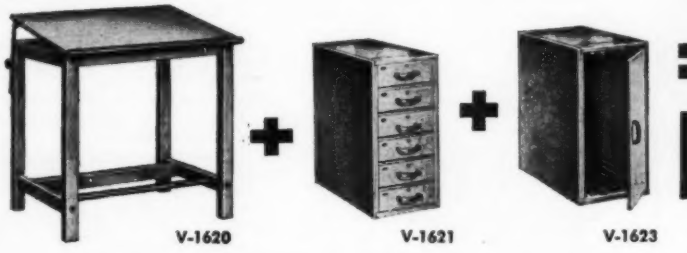

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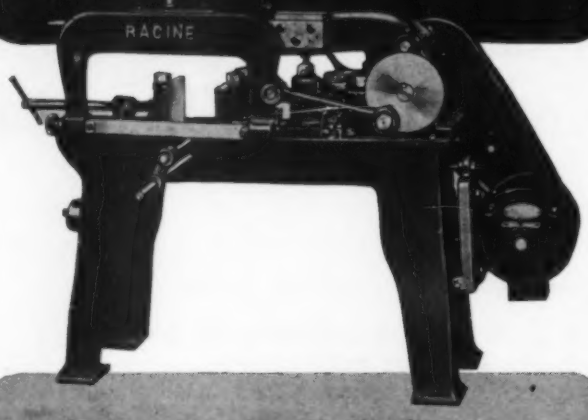

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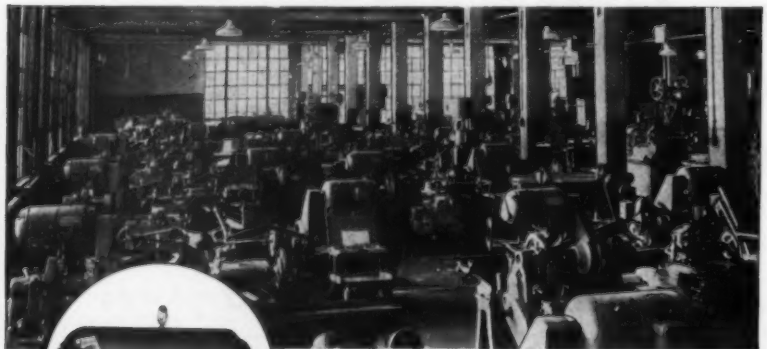
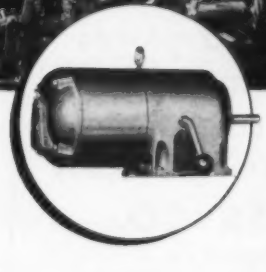
Ohio State is but one of many schools throughout the nation that have modernized their machine shops with LIMA DRIVES, providing the utmost in functional safety, adequate lighting, proper machine location and the complete elimination of hazardous lineshafting.

Ohio State's completely modernized Industrial Engineering Department





• *Selective Speed* LIMA GEARSHIFT DRIVES for application to all types of machine tools and production equipment are built in sizes from ½ to 25 HP.

Complete engineering facilities available

LIMA GEARSHIFT DRIVES & MOTORS

WRITE FOR LITERATURE

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THE LIMA ELECTRIC MOTOR COMPANY 3451 FINDLAY ROAD, LIMA, OHIO

New Publications

AM-FM Broadcaster's Handbook Revised

Priced at $5.40, this book contains 440 pages and 226 illustrations, and is thoroughly indexed. John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y.

The text, which deals with the practical side of radio broadcasting and its equipment, has been brought completely up to date by the author, Harold E. Ennes, who is staff engineer at Radio Station WIRE. All obsolete material has been eliminated, and the contents has been liberally expanded to cover greater detail.

The text, written in the broadcast operator's language, is intended not only for students of broadcasting techniques, but veteran broadcast operators also, who wish to keep abreast of current practices in the field.

Homespun Crafts

By E. Kenneth Baillie. Cloth, 159 pp., 6⅛ by 8¾ in., illus., $3. The Bruce Publishing Co., 400 No. Broadway, Milwaukee, Wis.

This text was written and tried out by the author in classes of young students, teacher trainers, teachers, youth leaders, occupational therapists, and hobbyists.

The book, with its illustrations and clear, understandable directions will also serve those who have the desire to make things but cannot attend classes where they would be instructed and shown how to make projects out of the many materials described.

But few tools are actually used, and most homes already possess those that are needed. The use of salvaged material is stressed.

American Woods

By Shelley E. Schoonover. Cloth, 250 pp., 6⅞ by 10¼ in., illus., $7.50. Published by Shelley E. Schoonover, 107 West "C" Ave., Glendale, Ariz.

An interesting book describing over 150 species of woods grown in the U. S. It is a helpful reference manual for craftsmen, hobbyists, and others who work with wood.

The book gives the outstanding characteristics of trees grown in this country, and also discusses their beauty, workability, and utility. It further shows where the different trees grow, and the uses to which they are put.

(Continued on next page)

TEACHING MATERIALS

(Continued from previous page)

Requirements for Individual Water-Supply and Sewage-Disposal Systems: By States (Obtainable from FHA Insurance Office in Each State)

United States Federal Housing Administration (Underwriting Division)
Washington 25, D. C.

Asphalt Insulating Siding (Bulletin No. UM-8)
Special Zinc Alloy Building Products (Flashing, Gutters, Downspouts) (Bulletin No. UM-3)
Two-Coat Paint Systems for Exterior Use (Use of Materials Bull. UM-4)
Provisions for General Storage Space Wood for Finish Floors (Bulletin No. UM-2)

United States Federal Security Agency (Public Health Service)
Washington 25, D. C.

Individual Water Supply Systems (Public Health Service Publication No. 24) (1950), 20¢
Home Sanitation (Leaflet) — Single Copies from Above Agency (Sale Price — $1.50 per 100 copies from GPO)
Individual Sewage Disposal Systems (Reprint 2461) (1947), 15¢
Studies on Household Sewage Disposal Systems (Research Report Part I), $1.25
The Sanitary Privy

United States Federal Security Agency (U. S. Office of Education)
Washington 25, D. C.

Light Frame House Construction (Bulletin No. 145), 45¢
Landscaping the Farmstead (Bulletin No. 189), 30¢

United States Printing Office
Superintendent of Documents
Washington 25, D. C.

Employment Outlook in Men's Tailored Clothing Industry, No. L2.3:1010, 25¢
Labor-Management Contract Provisions, 1949–50, No. L2.3:1022, 25¢
Laws Relating to Veterans and Their Dependents, No. Y 4.V 64/3:L41/940-50, 25¢
Legal Status of American Family, No. L 13.2:F 21, 15¢
Occupational Wage Survey:
Atlanta, Georgia, 1951, No. L 2.3:1031, 30¢
Denver, Colorado, 1951, No. L 2.3:1029, 35¢
San Francisco-Oakland, California 1951, No. L 2.3:1028, 50¢

United States Housing and Home Finance Agency
Washington 25, D. C.

Insulation of Concrete Floors in Dwellings, 10¢
Insulation: Where and How Much
Performance Standards — Structural and Insulation Requirements for Houses, 10¢
Wood Roof Trusses for Small Dwellings (Technical Reprint Series No. 2), 10¢
Report of the Co-ordinating Committee for a National Plumbing Code (Domestic Commerce Series No. 28), 50¢
Prevention of Dampness in Basements (Tech. Bull. No. 14), 20¢

(To be continued)

NEW PUBLICATIONS

(Continued from previous page)

Small Commutator Motors

By Kennard C. Graham. Cloth, 283 pp., 5¾ by 8½ in., illus., American Technical Society, Chicago, Ill.

An excellent text for the student, and a helpful reference book for the practical electrician who works on and with small commutator motors.

The book presents with clear explanatory material and fine illustrations the general theory of repulsion-motor operation; how to wind armatures by hand; how to repair form-wound coils on motors; types of repulsion motors; trouble shooting and repairing repulsion motors; and winding, assembling, and trouble shooting d.c. motors.

Finishing Materials and Methods

By George A. Soderberg. Cloth, 320 pp., 6¼ by 9¼ in., illus. McKnight & McKnight Publishing Co., Bloomington, Ill.

A text that gives the student not only the information needed to use finishing materials properly, but also an understanding of the technical facts that underlie the improvements which modern chemistry has been able to bring about in this age-old field of protecting and beautifying the wood and metal surfaces of the numerous articles of manufacture.

The book contains 31 chapters to discuss the materials and methods that are now being used by the craftsmen in the finishing field.

Electrical Communications Experiments

By Henry R. Reed, T. C. Gordon Wagner, and George F. Corcoran. Cloth, 458 pp., 6⅛ by 9¼ in., illus., $6.75. John Wiley & Sons, Inc., New York City.

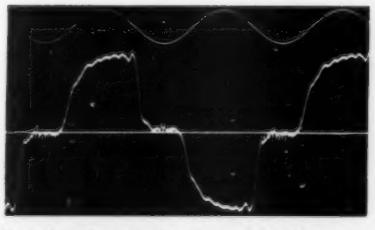
A book containing 60 experiments on d.c., and a.c. fundamentals, transmission lines, engineering electronics, and radio engineering.

These experiments cover a wide range and can be adapted readily to the needs of electrical engineering students from sophomore through senior levels.

The Circular Saw

By Ray E. Haines, John V. Adams, John G. Miller, Robert L. Thompson, and Raymond Van Tassel. Cloth, 118 pp., 7⅝ by 10¼ in., trade edition, $2.95; text edition, $2.36. D. Van Nostrand Co., Inc., New York, N. Y.

A book which describes the circular saw, explains how it is used and cared for, and shows how its use simplifies the work in the 28 useful projects that it presents to the reader.



Typical oscillograph of exploring-coil voltage, normal excitation, full-load.

The exploring coil is isolated from the armature circuit electrically, but is subject to the same flux as the armature winding. Only one side of the exploring coil is in a conventional armature slot. The other side lies in a special groove in the armature shaft and this side of the coil is not in the flux path. In effect, the exploring coil gives a true indication of a single conductor cutting the flux of the machine.

Professor F. Wahler of the Polytechnic Institute of Brooklyn, N. Y. says:
"The spontaneous enthusiasm shown by students using this exploring-coil generator to study armature reaction, proves that it is a 'must' for all electrical machinery laboratories."

General Electric Company, Section 687-71
Schenectady 5, N. Y.

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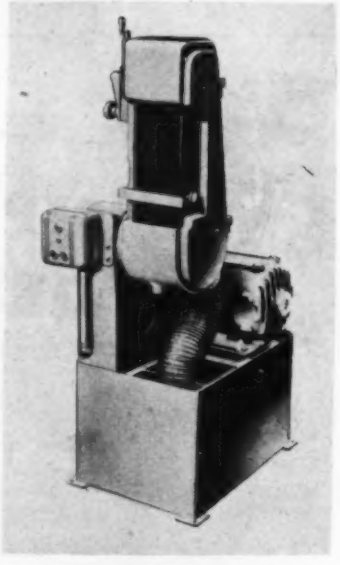
CHICAGO 37, ILLINOIS

SHOP EQUIPMENT NEWS

PORTER-CABLE ABRASIVE-BELT GRINDER, MODEL 506

A new all-purpose belt grinder which is adaptable to a wide range of grinding operations has just been placed on the market by the Porter-Cable Machine Company of Syracuse, N. Y.

It is equipped with a standard 6-in. belt which runs over a 12½-in. platen, thus making it an economical size for medium work.



Porter-Cable Model 506 Abrasive-Belt Grinder

It is used primarily for freehand applications on work which requires flat surfaces, deburring, squaring, chamfering, rounding, and polishing, and it can be used for metal, wood, glass, and plastics applications.

This Model 506 machine can be changed over from vertical to horizontal operation in only one minute by simply loosening two hex nuts. For smaller pieces, particularly for those having more length than thickness, the machine is usually set in its vertical position. The work is supported by a work rest and squared with the platen.

For larger or heavier pieces, the work is usually set in its horizontal position.

The grinder is equipped with two-speed pulleys for 3300 and 4000 s.f.p.m. The pulleys are quickly and easily changed to the proper surfacing speed for metal, wood, or glass. An optional set of pulleys for 2400 and 5500 s.f.p.m.

This machine, with a built-in coolant system, may be used for grinding plastics, glass, and other materials requiring a wet abrasive belt. The 24-gallon tank has a large chip basket to facilitate clean out. The pump forcibly sprays coolant on the belt within the machine to flush grindings from the belt. The coolant then runs downward through a large flexible dust tube and is filtered twice before re-entering the pump.

The drive unit for the machine is 3 h.p., 220/440 volts, 60 cycle, 3 phase, 1750 r.p.m. It is totally enclosed with across-the-line starter and wiring.

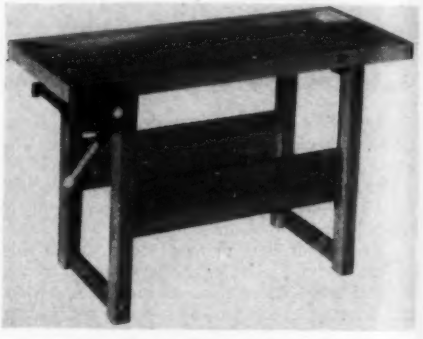
It is 10 in. wide by 7 in. deep, adjustable to 45 deg. The table is slotted for a gauge which is adjustable through 90 deg.

For further information write to *Porter-Cable Machine Co., Dept. PR-3, Syracuse 8, N. Y.*

For brief reference use IAVE — 0401.

NEW WORKBENCHES

The Engineering Manufacturing Company of Sheboygan, Wis., announces the addition of their new classroom workbench. This is made in two styles. There is a choice of either a single workbench 52 in. long by 22 in. wide by 32 in. high, or a double workbench 52 in. long by 36 in. wide by 32 in. high.



New Engineering Mfg. Co. workbench

The single workbench has a well at the rear of the top for the protection of the various tools that are being used at any particular time. If it is so ordered the top can be had solid for its entire width. The bench is equipped with a woodworker's vise and a movable bench dog.

This vise is of the rapid acting continuous screw type. The vise jaws are 7 in. wide by 4 in. deep, and will open to 9 in. when fully extended. The front jaw is fitted with a retractable stop. This lines up with movable dog hole positions in the bench top. The vise itself is equipped with a hardwood handle.

For further information write directly to *Engineering Mfg. Co., 619 North Commerce St., Sheboygan, Wis.*

For brief reference use IAVE — 0402.

ROCKWELL MFG. CO. HAS NEW ADDITION

The Rockwell Manufacturing Company has announced the acquisition of the Deluxe Saw & Tool Co., 2476 S. Blue Island Ave., Chicago, and the Karbide King Tool Corporation.

The newest members of the Rockwell family of companies started in business in 1945 and operate plants in Chicago, Ill., and High Point, N. C. Beyond the new product functions of these plants they house extensive service facilities.

The Deluxe Saw & Tool Co. pioneered the manufacture of tungsten carbide tipped circular saws for industrial application. The popular acceptance of this new type saw guarantees longer

(Continued on page 36A)

WEBER DRAWING MATERIALS

for Mechanical Drawing Classes

For precision student work make WEBER – COSMOS DRAWING INSTRUMENTS (Original Round System) the heart of your equipment. Use WEBER – COSMOS INSTRUMENTS with the other Weber drawing necessities, including T Squares, Triangles, Curves, Scales, Slide Rules, Drawing Boards, and Waterproof Drawing Inks for top performance at school budget prices.

Weber – Cosmos Drawing Instruments are available in sets, and separate pieces; also a full line of replacement parts. Superb in workmanship and materials.

Descriptive data on request.

SCHOOL ART AND DRAFTING ROOM FURNITURE

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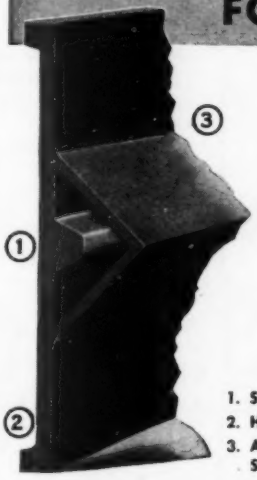

When you specify Sterling Flasks, you get the very best that money can buy. For Sterlings are backed by almost a half-century of "know-how" in fabricating precision-built foundry flasks. Sterling pioneered and perfected the famous ROLLED STEEL CHANNEL construction, long proven superior under rough foundry usage. That's why, today, you will find Sterlings in more than 4500 foundries. Write for Catalog No. 60 describing the complete line of Sterling Foundry Equipment.

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Milwaukee 14, Wis., U.S.A.

1. Solid Rolled Reinforcing Rib
2. Heavy Square Flanges with Full-Width Bearing
3. Angle Reinforcement Welded Around Flask Section

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HIGGINS INK

James Neebe, who is 25, won the 1951 Gold Brush Award with this delightful study. He executed it originally for an Ipana advertisement.

The basic art medium since 1880

Original size 9⅛"x6" • From a photograph by Anton Bruehl

The Illustration The tonal values create a subtle, related harmony. The textural treatment is superb. Note the convincing representation of grained wood, the lampshade, highlights in the lamp and the fire-irons. Compare the portrayal of skin, hair, dress; each has the *feel* of its own unique texture.

The Medium Higgins American India Ink of course. Neebe has used no other since his early student days. He likes its smoothness, its uniformity, and the way it lends itself to delicate lines and to every shade of expression.

At art, drafting and stationery dealers everywhere

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Grinding can be done on a coarse, coarse or fine or emery leather stropping or emery wheels. Unit is compact, efficient, serviceable, easily accessible and has ball bearing direct motor drive. Especially guarded for school shop use. Details on request.

MUMMERT-DIXON CO.

HANOVER, PENNSYLVANIA

Originators and Pioneer Manufacturers of Oilstone Tool Grinders

SHOP EQUIPMENT NEWS

(Continued from page 34A)

service, more accurate cuts, and smoother finishes on wood, plastic, hardboards, fibers, and metals.

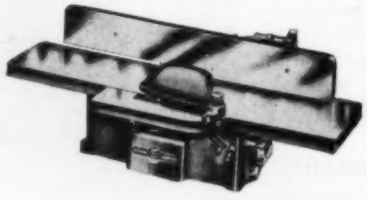
The Chicago plant will remain under the supervision of A. G. Feldman, one of the founders of Deluxe, and Claud T. Miller will manage the High Point plant.

This brings the number of subsidiaries and divisions of Rockwell, whose headquarters are in Pittsburgh, Pa., to 19.

NEW ATLAS-POWER KING 4-IN. JOINTER-PLANER

The new Atlas-Power King 4-in. jointer-planer marketed by the Atlas Press Co., possesses several exclusive features for greater accuracy, safety, economy, and efficiency.

For example, the rear bearing cap is easily removable so the entire head can be quickly taken out and the blades resharpened without disturbing their setting. Once the head is replaced, the blades position simultaneously.



Atlas-Power King jointer-planer

This new machine cuts 4 in. wide, and 5/16 in. deep. Other features include: 25-in. precision-ground gray-iron table; exclusive 21 by 3-in. fence, rigidly supported at two points close to cutter head; stationary rear table for greater accuracy and efficiency; sealed-for-life ball bearings; heavy solid steel cutter head for smoother finishes; blade guards on both sides of fence; big capacity — rugged construction. A 1/3-h.p., 1725-r.p.m. motor is recommended.

For illustrated catalog write to the *Atlas Press Co., 371 N. Pitcher St., Kalamazoo, Mich.*

For brief reference use IAVE — 0403.

(Continued on page 38A)

LOOMS, Table and Foot Reed, Raphia, Handicraft Supplies

Send for catalog

J. L. HAMMETT CO.

CAMBRIDGE, MASS.

TACKLE BUILDING

A Stimulating Shop Project

Write for Complete Information

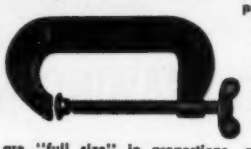
EMPIRE TACKLE COMPANY

6 Genesee Street, New Hartford, N.Y.

SPECIFY AND INSIST UPON GENUINE "Jorgensen" TRADE MARK REG U S PAT OFF

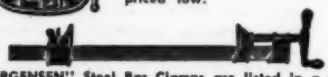
"C" CLAMPS

Style #120 "JORGENSEN" "C" Clamps offer the greatest possible value. Correctly designed and liberally proportioned, their low cost, as compared to their great strength, is usually a real surprise!



Where price is the prime consideration, Style #1 "JORGENSEN" Carriage Clamps will be found to be the choice of careful buyers. Very low in cost — yet they are "full size" in proportions, and will give long, satisfactory service.

"PONY" "C" Clamps are small tools of endless uses, built to real industrial standards. A variety of sizes is available, all priced low.



"JORGENSEN" Steel Bar Clamps are listed in a wide range of styles and sizes, for every purpose. Fastest operating, and most economical because of the long service they give.

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"C" Clamps, Handscrews, Steel Bar Clamps, Clamp Fixtures, Press Screws, Lathe Dogs, etc., are available through your favorite tool supplier — cost no more than ordinary clamps!

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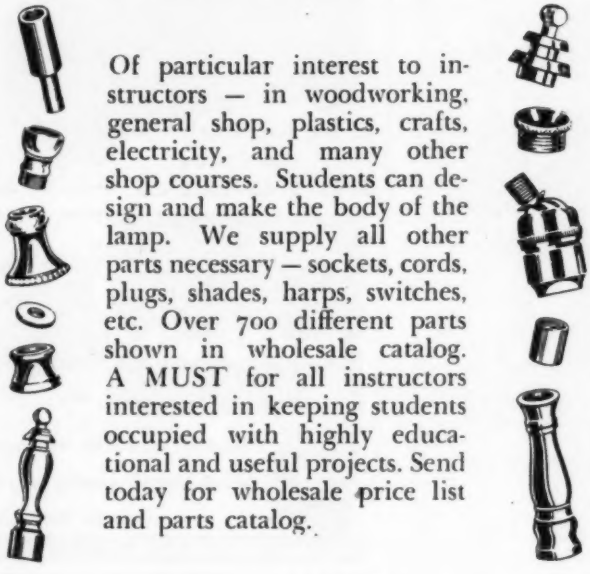

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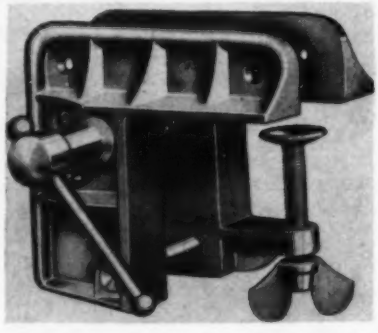
SHOP EQUIPMENT NEWS

(Continued from page 36A)

NEW CARPENTER'S VISE

A new carpenter's vise, light enough so that it can be carried in an ordinary tool kit, is announced by The Columbian Vise & Mfg. Co., Cleveland.



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For complete specifications and additional data, write for Bulletin 655 CV, *The Columbian Vise & Mfg. Co., 9021 Bessemer Ave., Cleveland 4, Ohio.*

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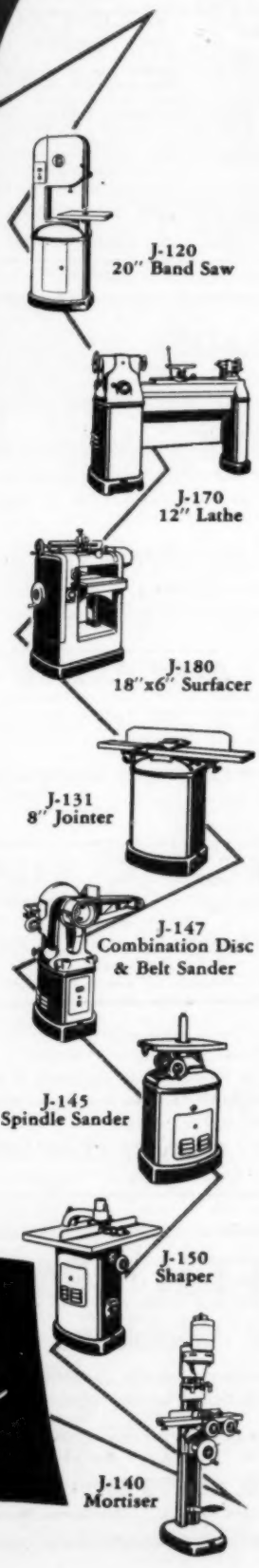

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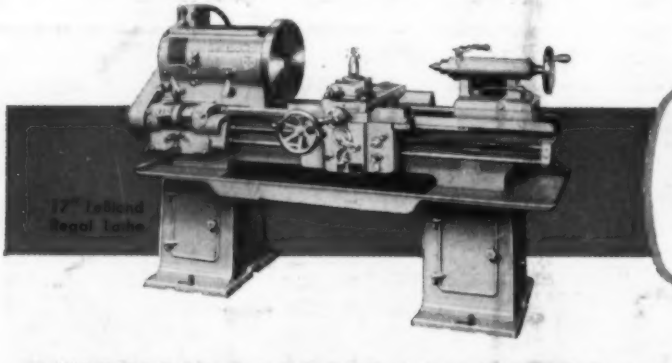

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